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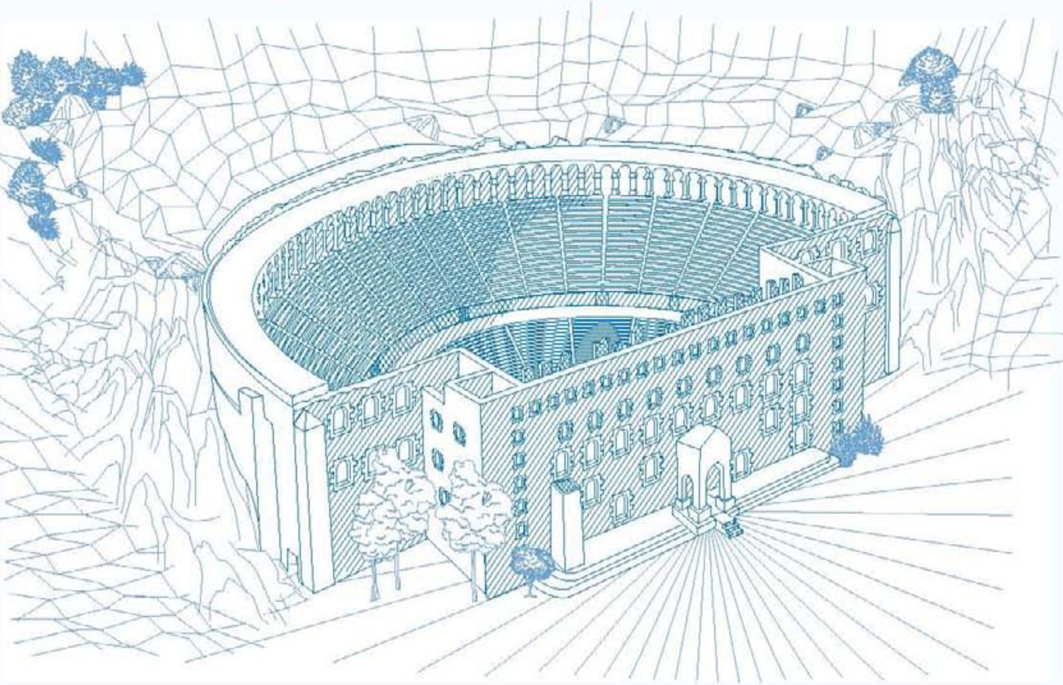
Excel® 2007 Programming

Your visual blueprint™ for creating interactive spreadsheets



by Denise Etheridge

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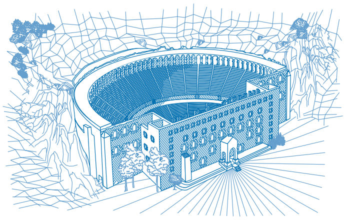

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This book is dedicated to Frederick Douglas Etheridge, Jr.

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HOW TO USE THIS BOOK

Microsoft Office Excel 2007 Programming: Your visual blueprint for creating interactive spreadsheets uses clear, descriptive examples to show you how to use powerful Excel macros. If you are already familiar with Excel macros, you can use this book as a quick reference.

Who Needs This Book

This book is for the experienced computer user who wants to find out more about Excel programming. It is also for more experienced Excel users who want to expand their knowledge of the different features that Excel has to offer.

Book Organization

Microsoft Office Excel 2007 Programming: Your visual blueprint for creating interactive spreadsheets has 17 chapters and 2 appendices.

Chapter 1, "Using Macros and Form Controls," shows you how to work with macros in Excel, how to record a simple macro, how to assign macros to the Quick Access toolbar, how to launch a macro, and how to remove a macro from a workbook.

Chapter 2, "Using the Visual Basic Editor," is about the Visual Basic Editor (VBE) that comes with Microsoft Office applications. This chapter shows you how to set up your Visual Basic Editor window to quickly create and modify code modules.

Chapter 3, "Introducing Visual Basic for Applications," introduces you to the essentials of Visual Basic for Applications (VBA). This chapter also covers some VBA programming fundamentals that enable you to use the material in the chapters that follow to create your own Excel macros.

Chapter 4, "Introducing the Excel Object Model," shows you how to work with the Excel Object Model to access the various elements that make up the Excel application. This chapter provides a foundation for the information covered in the remainder of the book, particularly Chapters 9 to 12.

Chapters 5 to 7 build on the VBA programming language by showing you how to work with variables and create arrays. You also learn how to use the various control statements to specify the code that executes when you run a macro. You create dialog boxes using the MsgBox and InputBox functions.

Chapter 8, "Debugging Macros," shows you how to use the various features of the Visual Basic Editor to find programming and logical errors within your VBA code.

Chapters 9 to 12 illustrate how you can use the Workbook, Worksheet, and Range objects to create custom macros. You also learn how to use the corresponding properties and methods associated with these objects.

Chapter 13, "Creating Dialog Boxes and Customizing the Ribbon," shows you how to create a graphical interface for your macros by creating custom dialog boxes and adding items to the Ribbon.

Chapter 14, "Working with Charts," shows you how to create and modify charts from within your macro.

Chapter 15, "Automating Procedures with Excel Events," shows you how to capture user events and use those events to trigger procedures. You also learn how to execute a procedure at a specific time, or how to determine when a specific key sequence is pressed.

Chapter 16, "Building Add-Ins," shows you how to create and load add-ins.

Chapter 17, "Understanding XML," introduces you to Extensible Markup Language (XML). You learn how to open an XML file, create an XML map, import an XML file, and export an XML file.

The appendices are reference sections. After you become familiar with the contents of this book, you can use the appendices to obtain at-a-glance information about VBA statements, functions, constants, and controls used by functions, properties, methods, and RibbonX.

What You Need to Use This Book

Windows Requirements

- 256 megabyte (MB) RAM or higher
- 500 megahertz (MHz) processor or higher
- 2 GB of available hard disk space
- CD-ROM or DVD drive
- Keyboard and pointing device, such as a mouse
- 1024x768 or higher resolution monitor

Microsoft Windows XP with Service Pack (SP) 2, Windows Server 2003 with SP1 or later operating system.

The Conventions in This Book

A number of styles have been used throughout *Microsoft Office Excel 2007 Programming: Your visual blueprint for creating interactive spreadsheets* to designate different types of information.

`Courier Font`

Indicates the use of VBA and scripting language code, such as tags, attributes, statements, operators, functions, objects, methods, or properties.

Bold

Indicates information that you must type.

Italics

Indicates a new term.

Apply It

An Apply It section takes the code from the preceding task one-step further. Apply It sections allow you to take full advantage of VBA code.

Extra

An Extra section provides additional information about the preceding task. Extra sections contain the inside information to make working with Excel easier and more efficient.

What's on the Web Site

The Web site accompanying this book contains the sample files for the book that you can use to work with *Microsoft Office Excel 2007 Programming: Your visual blueprint for creating interactive spreadsheets.*

Introducing Excel Programming

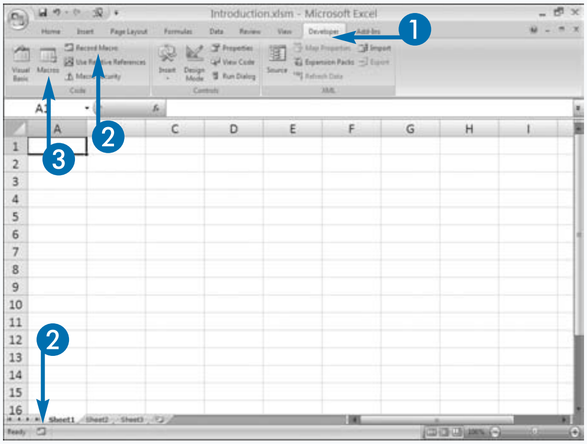
As you probably know, Microsoft Excel is an electronic worksheet you can use for a variety of purposes, including the following: maintain lists; perform mathematical, financial, and statistical calculations; create charts; and analyze your data with a PivotTable. Excel can also help you locate data, find trends in your data, and present your data to others.

This book is about automating the tasks you perform in Excel by using Visual Basic for Applications (VBA). You can use VBA to automate those repetitive tasks you perform frequently. For example, if the layout of your monthly report rarely changes, you can use VBA to set up your report each month.

VBA is a programming language; however, you do not have to be a programmer to automate the tasks you perform in Excel. You can also automate a task by using the macro recorder to create a macro. A *macro* is a recording of the steps you want to automate. You just click a button to turn on the macro recorder and begin performing the steps as you normally would. Excel records each step and creates the VBA code. When you finish, you click the Stop Record button. When you select your macro in the Macro dialog box and click the Run button, Excel plays back the steps you recorded. For example, if you record the steps necessary to create your monthly report, all you have to do each month thereafter is click a button and Excel automatically sets up your report.

With VBA, you can do more that just create macros. You can use VBA to edit macros, create new functions, create custom applications, and create add-ins. For these tasks, you must learn the VBA programming language. This book teaches VBA. It is based on Office 2007; code you write for Office 2007 may not be compatible with earlier versions of Excel.

Introducing Excel Programming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Controls
Source
Map Properties
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A1
1
2
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Sheet1
Sheet2
Sheet3
Ready

① Click the Developer tab.

Note: *See the section, “Introducing Macros,” to learn how to display the Developer tab.*

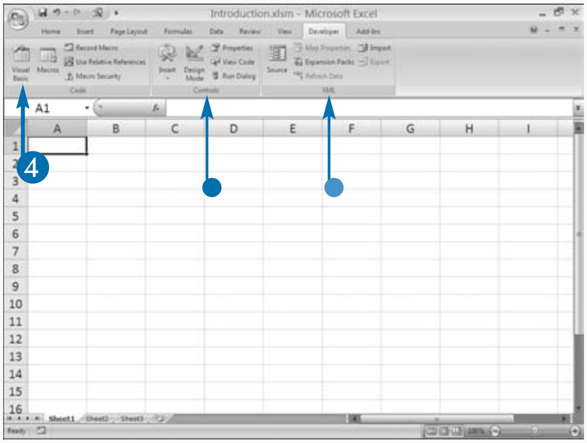
Use the options in the Code group to automate your tasks.

② Click either of these Record Macro buttons to record a macro.

Note: *See the section, “Record a Macro,” for more details.*

③ Click Macros to run a macro.

Note: *See the section, “Run a Macro,” for more details.*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Map Properties
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Refresh Data
Import
Export
XML
A1
4
Sheet1
Sheet2
Sheet3
Ready

- Use the options in the Controls group to add check boxes, fields, and other form controls to your worksheet.
- Use the options in the XML group to work with XML.

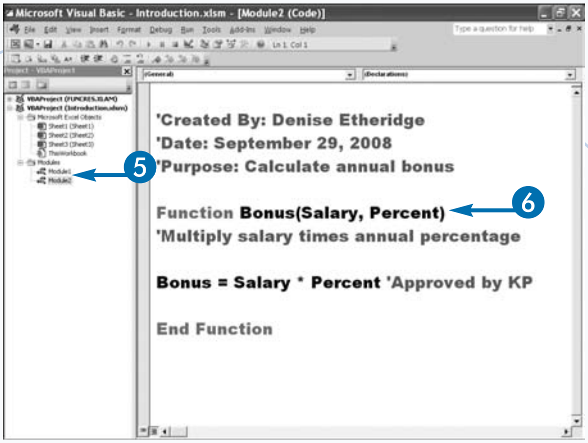
④ Click here or press Alt+F11.

Excel moves to the Visual Basic for Applications Editor (VBE).

Use the VBE to write and edit code.

Note: *See Chapter 2 to learn more about the VBE.*

5. Click the proper module to access your macros or the VBA code you have written.
6. Type or edit your code here.
7. Press Alt+F11 to return to Excel.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VBAProject (FUNCRES.XLAM)
VBAProject (Introduction.xlsm)
Microsoft Excel Objects
Sheet1 (Sheet1)
Sheet2 (Sheet2)
Sheet3 (Sheet3)
ThisWorkbook
Modules
Module1
Module2
(General)
(Declarations)
5
6

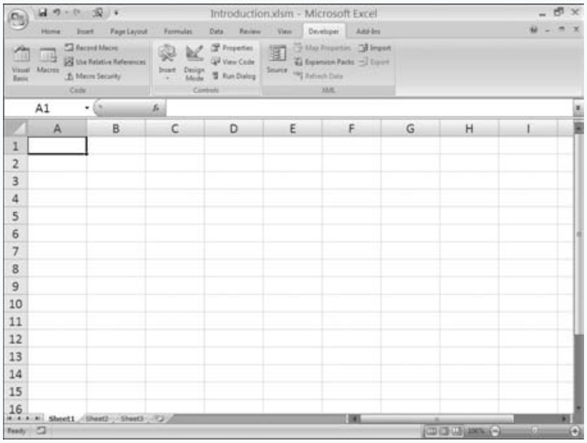
```
'Created By: Denise Etheridge
'Date: September 29, 2008
'Purpose: Calculate annual bonus

Function Bonus(Salary, Percent)
'Multiply salary times annual percentage

Bonus = Salary * Percent 'Approved by KP

End Function
```

The VBA returns you to Excel.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A1
Sheet1
Sheet2
Sheet3
Ready

Extra

You can also use Microsoft Visual Studio Tools for the Microsoft Office System (Visual Studio) to develop programs for Microsoft Office products. With Visual Studio, you can write in languages such as Visual Basic .NET, Visual C#, and Managed Extensions for C++. Visual Studio is not part of Microsoft Office; you must purchase it. Microsoft supports both VBA and Visual Studio.

Visual Studio is more difficult to learn than VBA and setting up and using Visual Studio is much more difficult than setting up and using VBA. However, Visual Studio offers better security, a more sophisticated development environment, and built-in Web services.

Introducing Macros

You can use macros to automate many of the tasks you perform in Excel. For example, if you frequently format your data in a particular way, you can use Excel's macro recorder to record the steps you use to format your data. You can then play back the recorded steps whenever you want to apply your format. Any series of commands you can execute in Excel, you can also record and play back.

The commands you use to create and execute macros are located on the Developer tab. By default, the Developer tab does not display in Excel. To display it, you must choose the Show Developer Tab in the Ribbon option in the Excel Options dialog box.

You begin recording macros by clicking Record Macro on the Developer tab or by clicking the Record Macro button on the status bar. Both commands open the Record Macro dialog box. For detailed instructions on how to use the Record Macro dialog box, see the section, "Record a Macro."

When you record a macro, you can record it using an absolute reference or a relative reference. If you record using an *absolute reference*, when Excel plays back your macro, it plays back the exact cells you clicked when you recorded the macro. If you record using a *relative reference*, Excel plays back the relative location of the cells you used when you recorded your macro. Click the Use Relative References button on the Developer tab to record using a relative reference. To learn more about absolute and relative references, see the section, "Record a Macro."

When you save a workbook that has macros, you must save it as a macro-enabled workbook. Excel gives macro-enabled workbooks an .xlsm file extension.

SHOW THE DEVELOPER TAB

① Click Customize Quick Access Toolbar and then click More Commands.

The Excel Options dialog box appears.

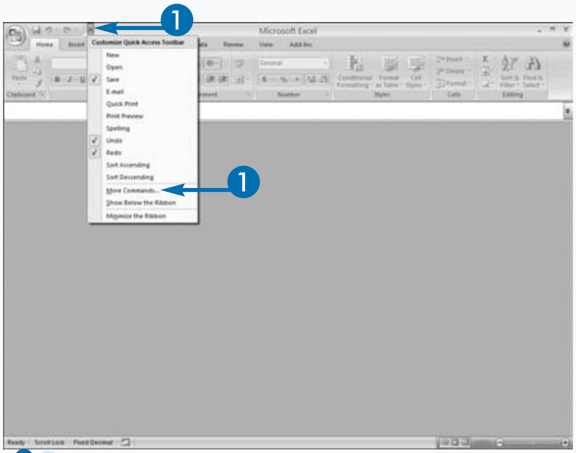
② Click Popular.

③ Click Show Developer Tab in the Ribbon (☐ changes to ☑).

④ Click OK.

The Developer tab appears in the Ribbon.

- Click to record a macro.
- Click to record with a relative reference.
- Click to change macro security.
- Click to run macros.
- Click to open the Visual Basic Editor.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Minimize the Ribbon
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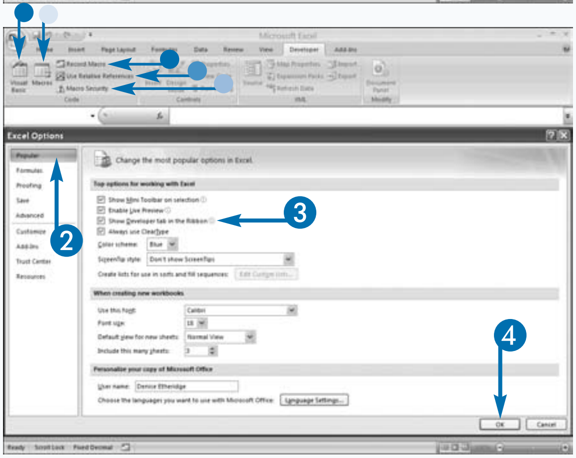
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Record Macro
Use Relative References
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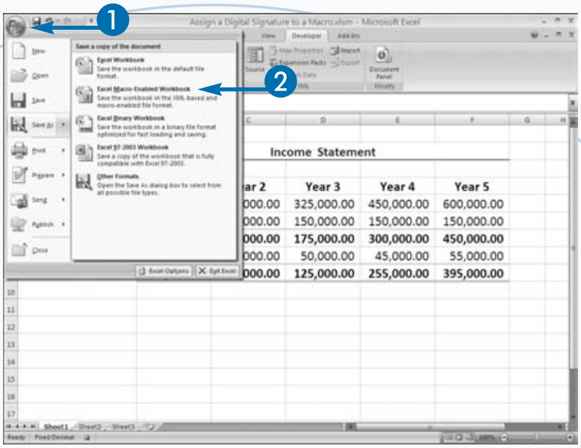
Excel Options
Popular
Formulas
Proofing
Save
Advanced
Customize
Add-Ins
Trust Center
Resources
Change the most popular options in Excel.
Top options for working with Excel
Show Mini Toolbar on selection
Enable Live Preview
Show Developer tab in the Ribbon
Always use ClearType
Color scheme: Blue
When creating new workbooks
Use this font: Calibri
Personalize your copy of Microsoft Office
User name: Denise Etheridge
OK
Cancel
2
3
4

SAVE A WORKBOOK

1. Click the Microsoft Office button.

   A menu appears.

2. Click Save As ➔ Excel Macro-Enabled Workbook.


1
2
Save a copy of the document
Excel Workbook
Excel Macro-Enabled Workbook
Excel Binary Workbook
Excel 97-2003 Workbook
Other Formats
Income Statement
Year 3
Year 4
Year 5

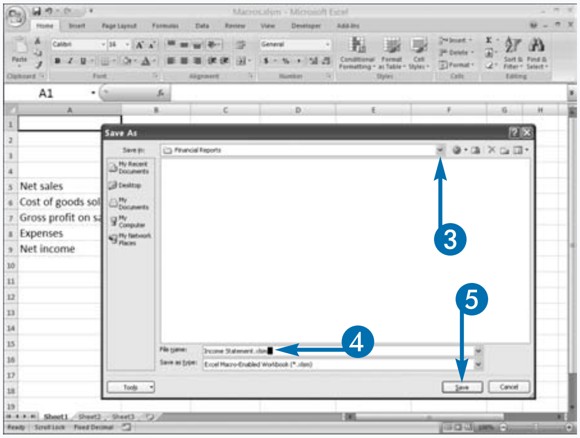
The Save As dialog box appears.

3. Click here and then select the folder in which you want to save your workbook.

4. Type the name you want to give your workbook.

5. Click Save.

   Excel saves your workbook as a macro-enabled workbook.


Save As
Financial Reports
Net sales
Cost of goods sol
Gross profit on s
Expenses
Net income
File name:
Income Statement.xlsm
Save as type:
Excel Macro-Enabled Workbook (*.xlsm)
Save
Cancel
3
4
5

Extra

Because of problems with macro viruses, Excel disables all macros by default when you open a workbook. You can click the Macro Security button on the Developer tab to change the default setting. To learn more about macro security, see the sections, “Set Macro Security,” “Create a Digital Signature,” and “Assign a Digital Signature to a Macro.”

If you have programming experience or aptitude, you can edit Excel macros by using the Visual Basic Editor, which is available by pressing the Visual Basic button on the Developer tab.

You can use the Macro dialog box to run a macro. To open the Macro dialog box, click the Macro button on the Developer tab, press Alt+F8, or place the View Macros button on the Quick Access toolbar.

To place the View Macros button on the Quick Access toolbar, click the Microsoft Office button, and then click Excel Options. The Excel Options dialog box appears. Click Customize. The Customize the Quick Access Toolbar pane appears. In the Choose Commands From field, choose Popular Commands and then click View Macros. Click the Add Button. Click OK. The View Macros button appears on the Quick Access toolbar.

Set Macro Security

Because of increasing problems with computer viruses, specifically macro viruses, the default Excel macro security setting disables all macros when you open a workbook, and allows you to decide on a case-by-case basis whether you want to enable them. This is true whether you created the macros or someone else created them.

You can change the Excel macro security setting. Excel provides four options:

- **Disable all macros without notification:** This option disables all macros and does not provide you with any security alerts to let you know macros exist.
- **Disable all macros with notification:** This is the default setting. It notifies you if macros are present so you can enable them on a case-by-case basis.
- **Disable all macros except digitally signed macros:** This option disables all macros except those digitally signed by a trusted publisher. If the publisher has digitally signed the macro but you have not opted to trust the publisher, you can enable the macro or trust the publisher. See the "Extra" information in the section, "Run a Macro," to learn how to trust a publisher.
- **Enable all macros (not recommended; potentially dangerous code can run):** This option allows you to run all macros. Because potentially dangerous code can run, Microsoft does not recommend this option.

Changes you make to macro security in Excel do not change the macro security in other Office programs.

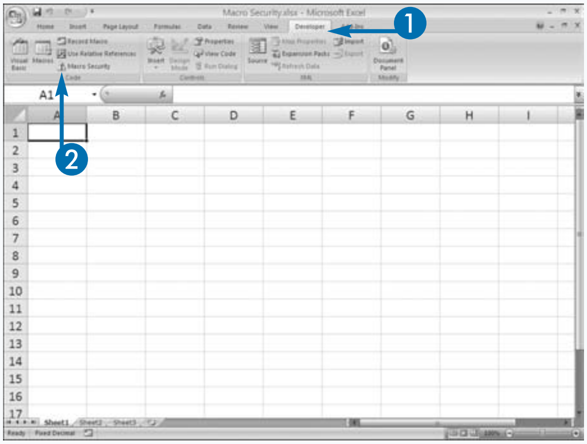
Macro creators use digital signatures to verify the safety of the macros they create. You can create your own digital signature by using the Microsoft Selfcert.exe tool, or you can obtain a digital certificate from a commercial certificate of authority vendor. For more information on the Microsoft Selfcert.exe tool, see the next section, "Create a Digital Signature."

Set Macro Security

① Click the Developer tab.

Note: *See the section, "Introducing Macros," to learn how to display the Developer tab.*

② Click Macro Security in the Code group.

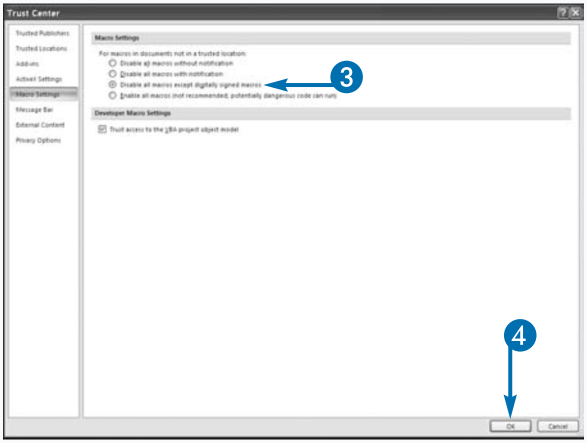

Macro Security.xlsx - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Record Macro
Use Relative References
Macro Security
Visual Basic
Macros
Code
A1
1
2
Sheet1
Sheet2
Sheet3
Ready

The Trust Center dialog box appears.

③ Click to select a macro setting (○ changes to ●).

④ Click OK.

Excel changes your macro security setting.


Trust Center
Trusted Publishers
Trusted Locations
Add-ins
ActiveX Settings
Macro Settings
Message Bar
External Content
Privacy Options
3
4
OK
Cancel

Macro Settings

For macros in documents not in a trusted location:

○ Disable all macros without notification
○ Disable all macros with notification
● Disable all macros except digitally signed macros
○ Enable all macros (not recommended; potentially dangerous code can run)

Developer Macro Settings

☑ Trust access to the VBA project object model

Create a Digital Signature

If you create a workbook that contains macros, you should consider using a digital signature. A digital signature provides assurance that the workbook file is valid and no one has altered it. You can create a personal digital signature by using the Microsoft Selfcert.exe tool. Projects signed with digital signatures created with the Selfcert.exe tool only work on computers that have the certificate in their Personal Certificates store.

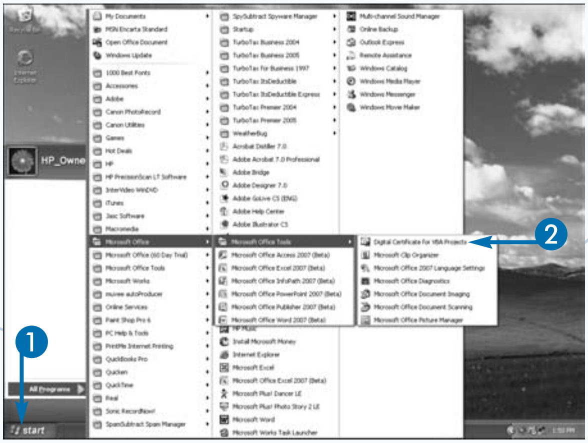
Digital signatures that you create with the SelfCert.exe tool work well for personal workbooks; however, if you plan to distribute your workbook to users outside your workgroup, you should consider acquiring a commercial digital signature file. When you use a commercial digital signature file, the digital ID attaches to the macro and remains with it; if anyone alters the macro, Excel notifies the user that someone has changed the macro and therefore the macro should not be trusted.

The most common provider of commercial digital certification is VeriSign, Inc. You can find out more about obtaining a commercial certification from VeriSign at www.verisign.com.

Extra

To view the certificates in your Personal Certificate store, open Internet Explorer. On the Internet Explorer menu, click Tools and then click Internet Options. The Internet Options dialog box appears. Click the Content tab. Click the Certificates button. The Certificates dialog box appears. Click the Personal tab. All of your personal certificates appear.

Create a Digital Signature



① Click Start.

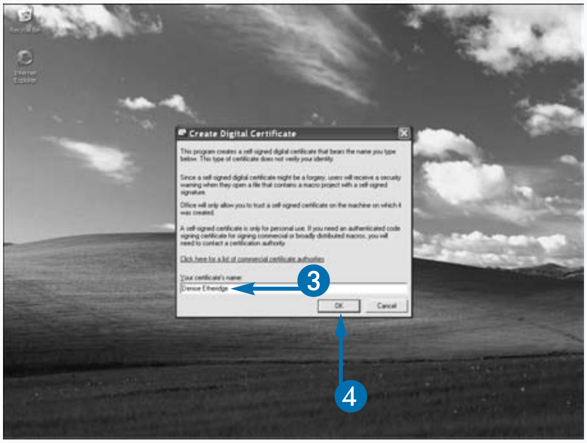
② Click All Programs ➔ Microsoft Office ➔ Microsoft Office Tools ➔ Digital Certificate for VBA Projects.

The Create Digital Certificate dialog box appears.

③ Type the name you want to give your certificate.

④ Click OK.

Excel creates a Personal Digital Certificate.



Create Digital Certificate

This program creates a self-signed digital certificate that bears the name you type below. This type of certificate does not verify your identity.

Since a self-signed digital certificate might be a forgery, users will receive a security warning when they open a file that contains a macro project with a self-signed signature.

Office will only allow you to trust a self-signed certificate on the machine on which it was created.

A self-signed certificate is only for personal use. If you need an authenticated code signing certificate for signing commercial or broadly distributed macros, you will need to contact a certification authority.

Click here for a list of commercial certificate authorities

Your certificate's name: Denise Etheridge

Record a Macro

A macro enables you to automate common tasks. You can use a macro to record any series of commands you can execute in Excel. For example, if you frequently apply a certain format to your worksheet, you can record the steps for creating the format and then play them back each time you want to apply the format.

Clicking the Macro Recorder button opens the Record Macro dialog box in which you can name your macro, assign your macro to a shortcut key, and tell Excel where you want to store your macro. You can name your macro anything you want, with the following limitations: the name must start with a letter; it can only contain letters, numbers, and underscores; and it cannot contain any spaces. You can assign any uppercase or lowercase letter to act as the shortcut key.

In the Record Macro dialog box, the Store Macro In field tells Excel where to store your macro. You can choose to store your macro in the Personal Macro Workbook, a New Workbook, or This Workbook. Use the Personal Macro Workbook option if you want to make your macro available to all Excel files. After you have stored a least one macro in the Personal Macro Workbook, the workbook opens whenever you open an Excel file. Use the New Workbook option if you have specialized macros that you want to use with multiple files. If you store your macro in a new workbook, you can use the macros whenever that workbook is open. Use the This Workbook option if you want your macro to be in the workbook in which you are currently working.

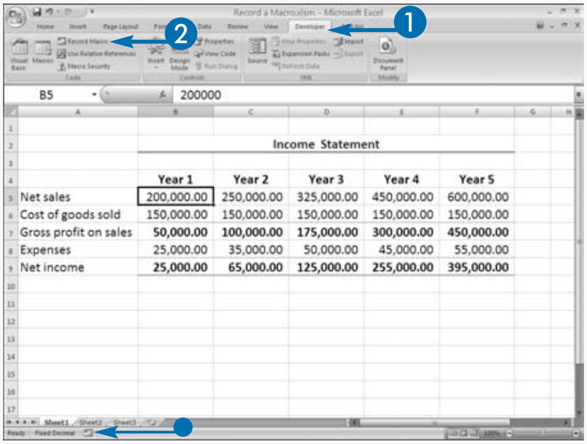
Record a Macro

① Click the Developer tab.

Note: *See the section, "Introducing Macros," to learn how to display the Developer tab.*

- Alternatively, click the Record Macro button on the status bar and skip step 2.

② Click Record Macro in the Code group.


Record a Macro.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Record Macro
Use Relative References
Macro Security
Code
Visual Basic
Macros
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
Document Panel
Modify
1
2
Sheet1
Sheet2
Sheet3
Ready
Fixed Decimal

B5 200000

	A	B	C	D	E	F
2				Income Statement		
4		Year 1	Year 2	Year 3	Year 4	Year 5
5	Net sales	200,000.00	250,000.00	325,000.00	450,000.00	600,000.00
6	Cost of goods sold	150,000.00	150,000.00	150,000.00	150,000.00	150,000.00
7	Gross profit on sales	**50,000.00**	**100,000.00**	**175,000.00**	**300,000.00**	**450,000.00**
8	Expenses	25,000.00	35,000.00	50,000.00	45,000.00	55,000.00
9	Net income	**25,000.00**	**65,000.00**	**125,000.00**	**255,000.00**	**395,000.00**

The Record Macro dialog box appears.

③ Type the name you want to give your macro.

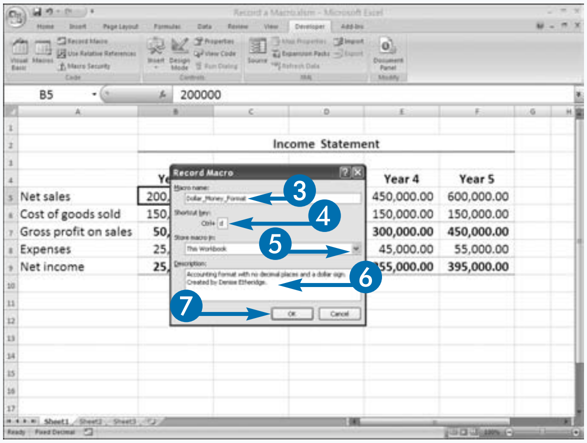
④ Type the shortcut key you want to assign to your macro.

Press Shift as you type to assign an uppercase key.

⑤ Click here and then select the workbook in which you want to store your macro.

⑥ Type a description of your macro.

⑦ Click OK.


Record a Macro.xlsm - Microsoft Excel
Record Macro
3
4
5
6
7
OK
Cancel
Sheet1
Sheet2
Sheet3
Ready
Fixed Decimal

Macro name: Dollar_Money_Format

Shortcut key: Ctrl+ d

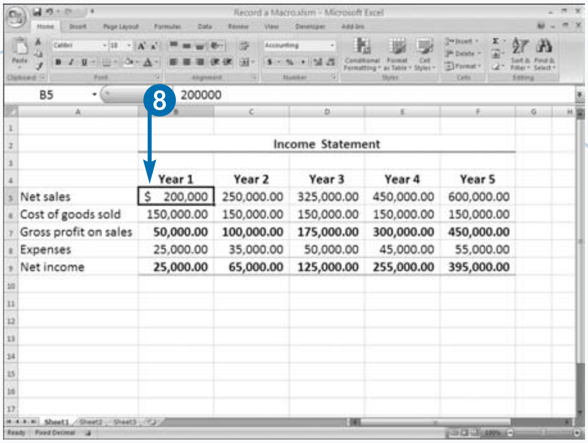
Store macro in: This Workbook

Description: Accounting Format with no decimal places and a dollar sign. Created by Denise Etheridge.

You are now ready to record your macro.

⑧ Perform the steps you want to record.

This example changes the number format.



B5 | 200000

Income Statement

	Year 1	Year 2	Year 3	Year 4	Year 5
Net sales	$ 200,000	250,000.00	325,000.00	450,000.00	600,000.00
Cost of goods sold	150,000.00	150,000.00	150,000.00	150,000.00	150,000.00
Gross profit on sales	50,000.00	100,000.00	175,000.00	300,000.00	450,000.00
Expenses	25,000.00	35,000.00	50,000.00	45,000.00	55,000.00
Net income	25,000.00	65,000.00	125,000.00	255,000.00	395,000.00

⑨ Click the Developer tab.

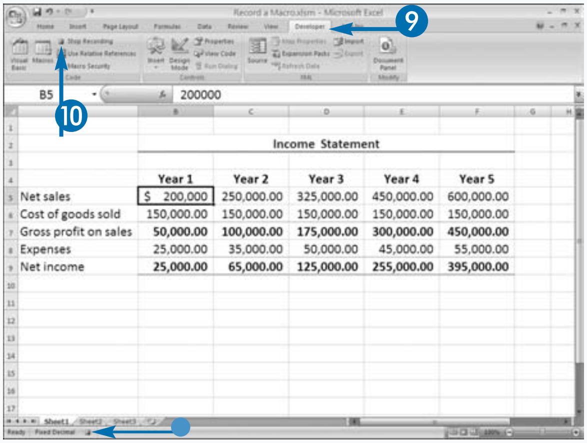
- Alternatively, click the Stop Recording button on the status bar and skip step 10.

⑩ Click Stop Recording in the Code group.

Excel stops recording your macro.

Your macro is ready for you to use.

Note: *See the section, "Run a Macro," to learn how to run a macro.*



B5 | 200000

Income Statement

	Year 1	Year 2	Year 3	Year 4	Year 5
Net sales	$ 200,000	250,000.00	325,000.00	450,000.00	600,000.00
Cost of goods sold	150,000.00	150,000.00	150,000.00	150,000.00	150,000.00
Gross profit on sales	50,000.00	100,000.00	175,000.00	300,000.00	450,000.00
Expenses	25,000.00	35,000.00	50,000.00	45,000.00	55,000.00
Net income	25,000.00	65,000.00	125,000.00	255,000.00	395,000.00

Extra

A macro you create in Excel can have a relative, absolute, or mixed reference. If you use a relative reference, Excel performs the macro based on a relative location. For example, suppose you move up two cells from cell A3 to A1 when creating your macro. When you run your macro, if you are in cell C3, Excel moves up two cells from cell C3 to C1. However, if you use an absolute reference, Excel performs the macro based on the exact cell addresses. For example, suppose again that you move up two cells from cell A3 to A1. When you run your macro, if you are in cell C3, Excel moves from there to the cells you used when you recorded your macro. That is, Excel moves from cell A3 to cell A1.

By default, Excel creates macros with an absolute reference. To create a macro with a relative reference, click the Use Relative Reference button on the Developer tab to toggle the relative reference option on. To create a macro with both a relative and an absolute reference — a mixed reference — toggle the Use Relative Reference on and off as needed as you create your macro.

Assign a Digital Signature to a Macro

A digital signature provides assurance that a workbook file is valid and no one has altered it. There are two types of digital signatures: personal digital signatures and commercial digital signatures. You can create a personal digital signature by using the Microsoft Selfcert.exe tool, or you can purchase a digital signature. Refer to the section, "Create a Digital Signature," to learn how to create digital signatures.

After you create a digital signature, you must attach it to your workbook. Attaching a digital signature is similar to sealing an envelope. If an envelope arrives sealed, you have some level of assurance that no one has tampered with its contents.

Use the Digital Signature dialog box to attach a digital signature. The Visual Basic Editor is a separate Excel module that you can use to edit your macro. You access the Digital Signature dialog box by opening the Visual Basic Editor. The Digital Signature dialog box lists valid certificates. You can use the Digital Signature dialog box to view certificates and to select the one you want to use.

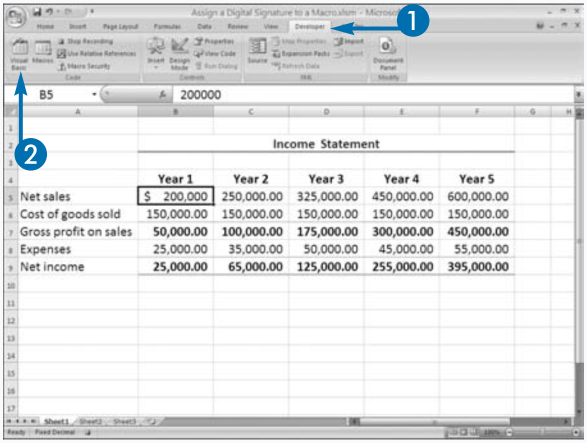
Unless you have on your computer a valid digital signature certificate for the signature used to sign a macro, Excel removes the digital signature if you modify a macro in a workbook, and you must reattach it. If you are not sure if a workbook has a digital signature, you can check the signature by reviewing the Digital Signature dialog box. If a workbook has a digital signature, the name of the signature appears in the Certificate Name field. If you click the Remove button in the Digital Signature dialog box, Excel removes the digital signature.

Assign a Digital Signature to a Macro

1. Click the Developer tab.

Note: *See the section, "Introducing Macros," to learn how to display the Developer tab.*

2. Click Visual Basic in the Code group.


Assign a Digital Signature to a Macro.xlsm - Microsoft
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Visual Basic
Macros
Stop Recording
Use Relative References
Macro Security
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
Document Panel
Modify
Sheet1
Sheet2
Sheet3
Ready
Fixed Decimal
1
2

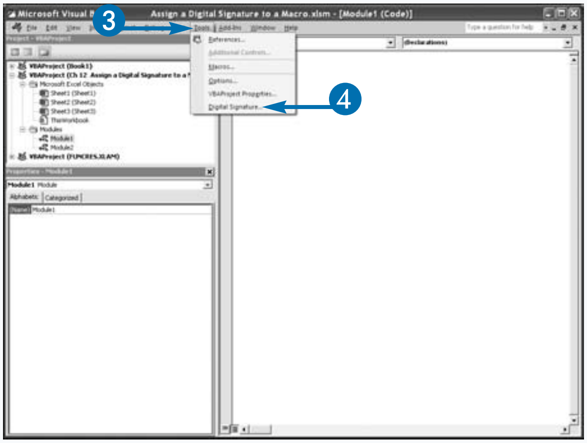
B5 | 200000

Income Statement

	Year 1	Year 2	Year 3	Year 4	Year 5
Net sales	$ 200,000	250,000.00	325,000.00	450,000.00	600,000.00
Cost of goods sold	150,000.00	150,000.00	150,000.00	150,000.00	150,000.00
Gross profit on sales	**50,000.00**	**100,000.00**	**175,000.00**	**300,000.00**	**450,000.00**
Expenses	25,000.00	35,000.00	50,000.00	45,000.00	55,000.00
Net income	**25,000.00**	**65,000.00**	**125,000.00**	**255,000.00**	**395,000.00**

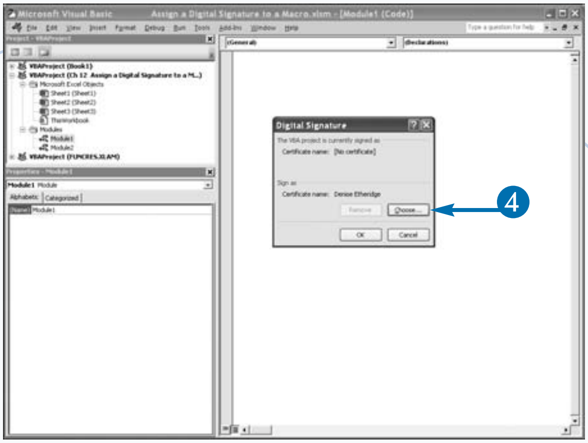
The Visual Basic Editor appears.

3. Click Tools ➔ Digital Signature.


Microsoft Visual B
Assign a Digital Signature to a Macro.xlsm - [Module1 (Code)]
File
Edit
View
Tools
Add-Ins
Window
Help
Project - VBAProject
VBAProject (Book1)
VBAProject (Ch 12 Assign a Digital Signature to a
Microsoft Excel Objects
Sheet1 (Sheet1)
Sheet2 (Sheet2)
Sheet3 (Sheet3)
ThisWorkbook
Modules
Module1
Module2
VBAProject (FUNCRES.XLAM)
Properties - Module1
Module1 Module
Alphabetic
Categorized
(Name)
Module1
(Declarations)
References...
Additional Controls...
Macros...
Options...
VBAProject Properties...
Digital Signature...
3
4

The Digital Signature dialog box appears.

4 Click Choose.


Microsoft Visual Basic Assign a Digital Signature to a Macro.xlsm - [Module1 (Code)]
File
Edit
View
Insert
Format
Debug
Run
Tools
Add-Ins
Window
Help
Project - VBAProject
VBAProject (Book1)
VBAProject (Ch 12 Assign a Digital Signature to a M...)
Microsoft Excel Objects
Sheet1 (Sheet1)
Sheet2 (Sheet2)
Sheet3 (Sheet3)
ThisWorkbook
Modules
Module1
Module2
VBAProject (FUNCRES.XLAM)
Properties - Module1
Module1 Module
Alphabetic
Categorized
(General)
(Declarations)
Digital Signature
Remove
Choose...
OK
Cancel
4

The VBA project is currently signed as

Certificate name: [No certificate]

Sign as

Certificate name: Denise Etheridge

The Select Certificate dialog box appears.

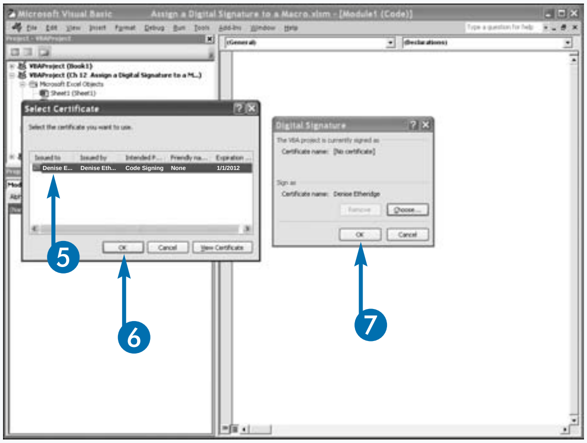
Note: *See the section, "Create a Digital Signature," to learn how to create a digital signature.*

5 Click the signature you want to apply.

6 Click OK to close the Select Certificate dialog box.

7 Click OK to close the Digital Signature dialog box.

Excel attaches the digital signature to your workbook.


Microsoft Visual Basic Assign a Digital Signature to a Macro.xlsm - [Module1 (Code)]
Select Certificate
Digital Signature
Remove
Choose...
OK
Cancel
View Certificate
5
6
7

Select the certificate you want to use.

Issued to	Issued by	Intended P...	Friendly na...	Expiration ...
Denise E...	Denise Eth...	Code Signing	None	1/1/2012

The VBA project is currently signed as

Certificate name: [No certificate]

Sign as

Certificate name: Denise Etheridge

Extra

If you have macro security enabled, Excel displays a warning just below the Ribbon when you open a workbook containing a signed macro. You can click the Options button located next to the warning to open the Microsoft Office Security Options dialog box, where you can indicate that you trust the publisher. Excel then saves the name of the publisher in the Trusted Publishers section of the Trust Center.

If you click the Macro Security button on the Developer tab, the Trust Center dialog box appears. Click Trusted Publisher to display a list of your trusted publishers. If you no longer want to trust macros from a publisher listed on the Trusted Publishers page, click the name of the publisher and then click Remove. The next time you open a workbook with a macro from a removed publisher, Excel again warns you about its macros.

Unless you have your macro settings set to enable all macros, Excel checks all documents you open for macros. See the section, "Set Macro Security," for more information. If you have a file that you do not want Excel to check, you can store it in a trusted location. In the Trust Center dialog box, click Trusted Locations to define a trusted location.

Run a Macro

Macros enable you to perform quickly tasks that would normally take multiple steps. When you run a macro, Excel replays the steps you recorded when you created the macro. You can run any macro located in any workbook as long as the workbook in which the macro is located is open. To run a macro, you can press the shortcut key you assigned when you created the macro or you can select the macro from the Macro dialog box.

When you create a macro, you can choose to store it in one of three locations: the current workbook, a new workbook, or the Personal Macro Workbook. By default, the Macro dialog box lists all of the macros in open workbooks. If a macro is stored in the Personal Macro Workbook, the workbook opens as a hidden file each time you open a file. By default, the macros in the Personal Macro Workbook always appear in the Macro dialog box.

You can use the Macros In field to limit the number of macros listed in the Macro dialog box. To see the macros in any open workbook, including the Personal Macro Workbook, select the All Open Workbooks option. To see the macros from a specific workbook, select the name of the workbook from the Macros In drop-down list. To see global macros stored in the Personal Macro Workbook, select the Personal.xlsb option.

To run a macro from another workbook, the macro must be from a signed source or you must enable all macros. You can set the security setting for macros. See the section, "Set Macro Security," for more information.

Run a Macro

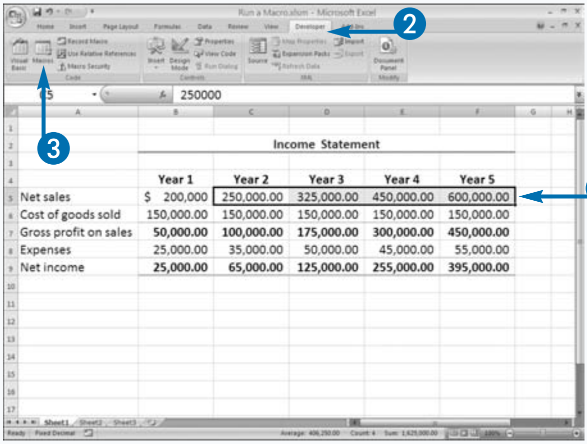
① Select the cells to which you want to apply your macro.

② Click the Developer tab.

Note: *See the section, "Introducing Macros," to learn how to display the Developer tab.*

③ Click Macros in the Code group.

Alternatively, click Alt+F8.

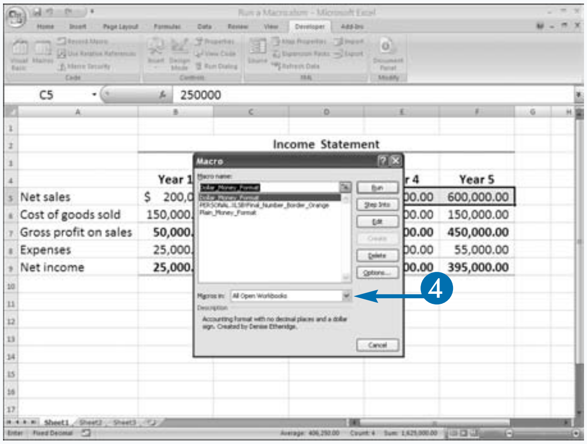


C5: 250000

	Income Statement				
	Year 1	Year 2	Year 3	Year 4	Year 5
Net sales	$ 200,000	250,000.00	325,000.00	450,000.00	600,000.00
Cost of goods sold	150,000.00	150,000.00	150,000.00	150,000.00	150,000.00
Gross profit on sales	50,000.00	100,000.00	175,000.00	300,000.00	450,000.00
Expenses	25,000.00	35,000.00	50,000.00	45,000.00	55,000.00
Net income	25,000.00	65,000.00	125,000.00	255,000.00	395,000.00

The Macro dialog box appears.

④ If your macro does not appear in the Macro dialog box, click here and then select the workbook that contains your macro.



Macro name: Dollar_Money_Format

Dollar_Money_Format
PERSONAL.XLSB!Final_Number_Border_Orange
Plain_Money_Format

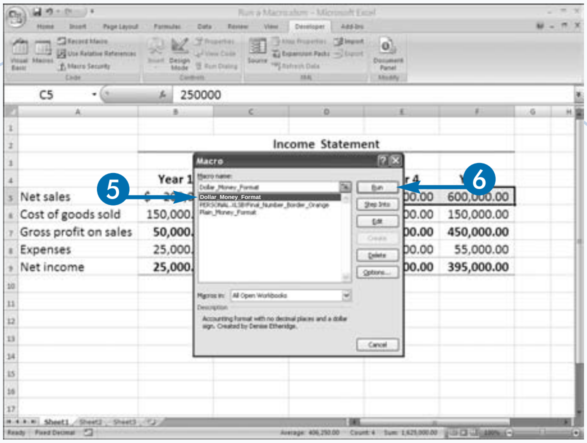
Macros in: All Open Workbooks

Description: Accounting format with no decimal places and a dollar sign. Created by Denise Etheridge.

Average: 406,250.00 Count: 4 Sum: 1,625,000.00

⑤ Click the name of the macro you want to run.

⑥ Click Run.



C5 250000

Macro name: Dollar_Money_Format

Dollar_Money_Format
PERSONAL.XLSB!Final_Number_Border_Orange
Plain_Money_Format

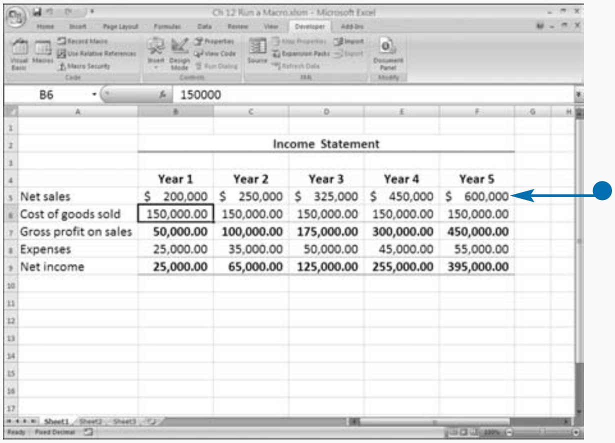
Macros in: All Open Workbooks

Description: Accounting format with no decimal places and a dollar sign. Created by Denise Etheridge.

Excel runs the macro.

- In this example, the macro adds dollar signs and removes the decimal places.

You can also run your macro by pressing the shortcut key you assigned when you created your macro.



B6 150000

	Year 1	Year 2	Year 3	Year 4	Year 5
Net sales	$ 200,000	$ 250,000	$ 325,000	$ 450,000	$ 600,000
Cost of goods sold	150,000.00	150,000.00	150,000.00	150,000.00	150,000.00
Gross profit on sales	50,000.00	100,000.00	175,000.00	300,000.00	450,000.00
Expenses	25,000.00	35,000.00	50,000.00	45,000.00	55,000.00
Net income	25,000.00	65,000.00	125,000.00	255,000.00	395,000.00

Extra

Excel differentiates between macros listed in the Macro dialog box by placing the name of the workbook that contains the macros in front of the macro name. For example, Excel lists a macro named Sum_Expenses in the Personal Macro Workbook as PERSONAL.XLSB!Sum_Expenses. If the macro Sum_Cells exists in both the Budget.xlsm and Expenses.xlsm workbooks, Excel treats them as two different macros. The Macro dialog box lists them as Budget.xlsm!Sum_Cells and Expenses.xlsm!Sum_Cells.

If you have macro security enabled, the Trust Center checks the macros when you open a workbook to see if the macros are valid. If there are any problems, Excel displays a warning just below the Ribbon. You can click the Options button located next to the warning to open the Microsoft Office Security Options dialog box.

In the Microsoft Office Security Options dialog box, click Help Protect Me from Unknown Content (Recommended) to disable the macros, click Enable the Content to enable the macros, or click Trust All Documents from this Publisher to add the macro publisher to the Trusted Publisher list. Excel does not display a warning when you open workbooks with macros if the publisher is on the Trusted Publisher list.

Create and Launch a Keyboard Shortcut

A keyboard shortcut is a combination of keys you press to execute a command. You can use a keyboard shortcut to launch an Excel macro command. You can assign an uppercase or lowercase key to a macro when you create it, or assign one later by using the Macro Options dialog box. You execute a macro keyboard shortcut by pressing the Ctrl key along with that uppercase or lowercase key. Refer to the section, “Record a Macro,” to learn how to create a macro.

Keyboard shortcuts are case sensitive. For example, Excel interprets a lowercase *m* and an uppercase *M* as two different keys. To execute a macro you have assigned to a lowercase letter, press Ctrl plus the letter, such as Ctrl+m. To execute a macro you have assigned to an uppercase letter, press Ctrl and Shift plus the letter, such as Ctrl+Shift+M.

If you assign the same keyboard shortcut to macros in two different workbooks, you may execute the wrong macro if you use the shortcut while you have both workbooks open. Excel cannot discern from which workbook you want the macro. You can use the Macro Options dialog box to reassign one of the conflicting macros to a new key.

You should also be careful not to assign the macro to a keyboard shortcut that Excel uses. If you do, Excel executes your macro instead of the command it created. For example, by default, Ctrl+o opens the Open dialog box. If you assign *o* to a macro, your macro overrides Excel’s assignment.

Create and Launch a Keyboard Shortcut

CREATE A KEYBOARD SHORTCUT

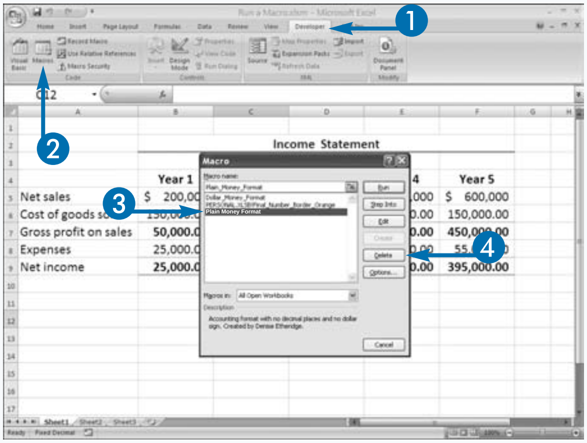
① Click the Developer tab.

② Click Macros in the Code group.

The Macro dialog box appears.

③ Click the desired macro.

④ Click Options.


1
2
3
4
Developer
Macros
Income Statement
Macro
Macro name:
Plain_Money_Format
Dollar_Money_Format
Plain Money Format
Run
Step Into
Edit
Create
Delete
Options...
Macros in: All Open Workbooks
Description
Cancel

Accounting format with no decimal places and no dollar sign. Created by Denise Etheridge.

The Macro Options dialog box appears.

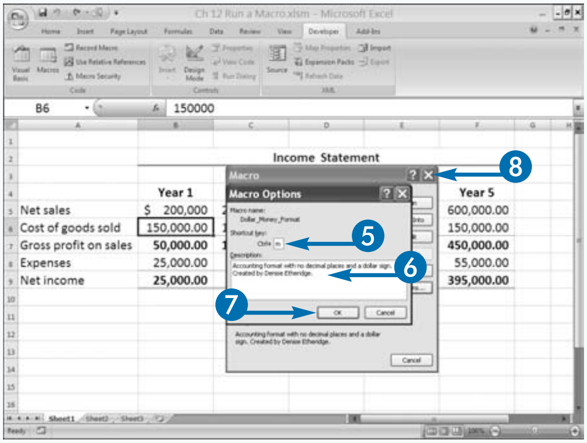
⑤ Type the desired shortcut key.

Press Shift as you type to assign an uppercase key.

⑥ Type a description.

⑦ Click OK.

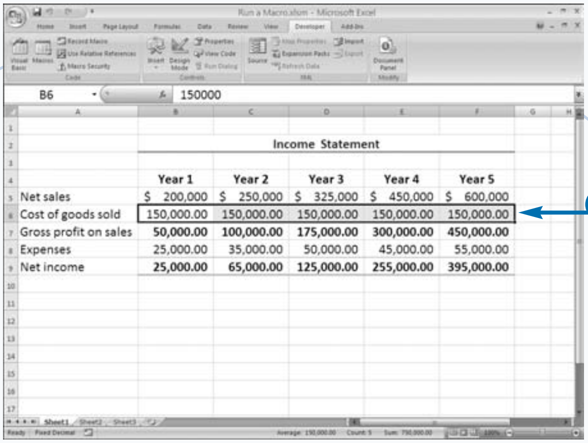
⑧ Click Close to close the Macro dialog box.


5
6
7
8
B6
150000
Income Statement
Macro
Macro Options
Macro name:
Dollar_Money_Format
Shortcut key:
Ctrl+ m
Description:
OK
Cancel

Accounting format with no decimal places and a dollar sign. Created by Denise Etheridge.

LAUNCH WITH A KEYBOARD SHORTCUT

1. Select the cells in which you want the macro to execute.
2. Press Ctrl and the shortcut key.

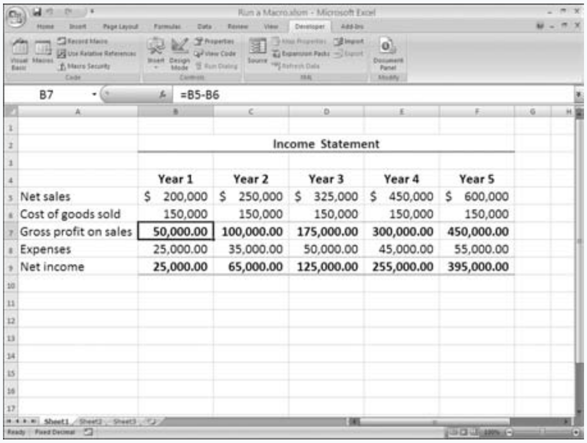

Run a Macro.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Sheet1
Sheet2
Sheet3
Ready
Fixed Decimal
1

B6 | 150000

	Income Statement				
	Year 1	Year 2	Year 3	Year 4	Year 5
Net sales	$ 200,000	$ 250,000	$ 325,000	$ 450,000	$ 600,000
Cost of goods sold	150,000.00	150,000.00	150,000.00	150,000.00	150,000.00
Gross profit on sales	50,000.00	100,000.00	175,000.00	300,000.00	450,000.00
Expenses	25,000.00	35,000.00	50,000.00	45,000.00	55,000.00
Net income	25,000.00	65,000.00	125,000.00	255,000.00	395,000.00

- The macro executes.

3. Repeat steps 1 and 2 to execute the macro again.


Run a Macro.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Sheet1
Sheet2
Sheet3
Ready
Fixed Decimal

B7 | =B5-B6

	Income Statement				
	Year 1	Year 2	Year 3	Year 4	Year 5
Net sales	$ 200,000	$ 250,000	$ 325,000	$ 450,000	$ 600,000
Cost of goods sold	150,000	150,000	150,000	150,000	150,000
Gross profit on sales	50,000.00	100,000.00	175,000.00	300,000.00	450,000.00
Expenses	25,000.00	35,000.00	50,000.00	45,000.00	55,000.00
Net income	25,000.00	65,000.00	125,000.00	255,000.00	395,000.00

Extra

If you do not use a macro shortcut frequently, it is easy to forget the keyboard shortcut you assigned to your macro. If you forget your keyboard shortcut, you can view it in the Macro Options dialog box.

You can execute a macro by assigning the macro to a picture, clip art, shape, or SmartArt. For example, if you want to assign a macro to a picture, you start by inserting the picture into your worksheet by clicking the Insert tab and then clicking Picture. The Insert Picture dialog box appears. In the Look In field, select the folder in which you stored the picture you want to insert. The pictures in that folder appear. Click the picture you want to insert and then click the Insert button. The picture appears in the worksheet. Click and drag the picture to place it where you want it and then double right-click the picture. A menu appears. Click Assign Macro. The Assign Macro dialog box appears. Click the macro you want to assign to the picture and then click OK. Excel assigns the macro to the picture. Click the picture when you want to execute the macro.

Assign a Macro to the Quick Access Toolbar

You can assign a macro to the Excel Quick Access toolbar. You can execute macros assigned to the Quick Access toolbar using a shortcut key or the Macro dialog box; however, using the Quick Access toolbar means you can access the macros by clicking the appropriate button.

When you add a button to the Quick Access toolbar, you can specify whether it should appear on the toolbar of all Excel workbooks or only on the Quick Access toolbar in the workbook you specify. By default, the button appears in all workbooks. If you have placed your macro in the Personal Macro Workbook, you will probably want your macro button to appear in all workbooks. If your macro is only available to a single workbook, your macro button should only appear on the Quick Access toolbar for that workbook.

You can use the Customize the Quick Access Toolbar pane of the Excel Options dialog box to add a macro button to the Quick Access toolbar. The Customize the Quick Access Toolbar pane has a number of options you can set. You can use the Modify button to specify the button you want to use to represent your macro. You can specify where on the Quick Access toolbar your button appears and whether the Quick Access toolbar appears above or below the Ribbon. You can click the Reset button to return the Quick Access toolbar to its default state.

Deleting a macro does not remove the macro button from the Quick Access toolbar. You use the Remove button on the Customize the Quick Access Toolbar pane of the Excel Options dialog box to remove a macro button.

Assign a Macro to the Quick Access Toolbar

① Click Customize Quick Access Toolbar and then click More Commands.

The Excel Options dialog box appears.

② Click here and then click Macros.

③ Click here and then click the workbook in which the button should appear.

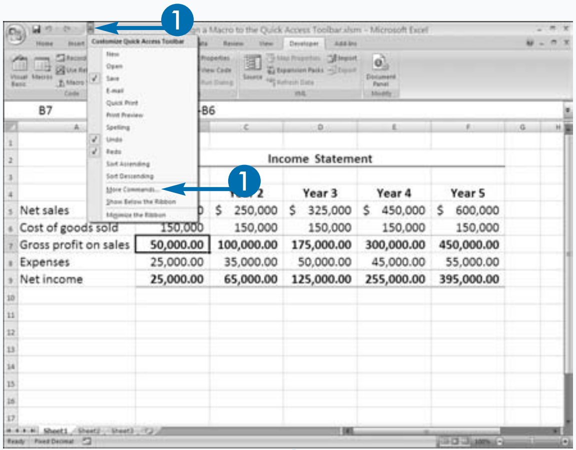
④ Click the macro you want to assign to the Quick Access toolbar.

⑤ Click Add.

- The macro appears in the box on the right. Macros display on the Quick Access toolbar in the order shown here.
- Click to move the macro up.
- Click to move the macro down.

⑥ Click Modify.

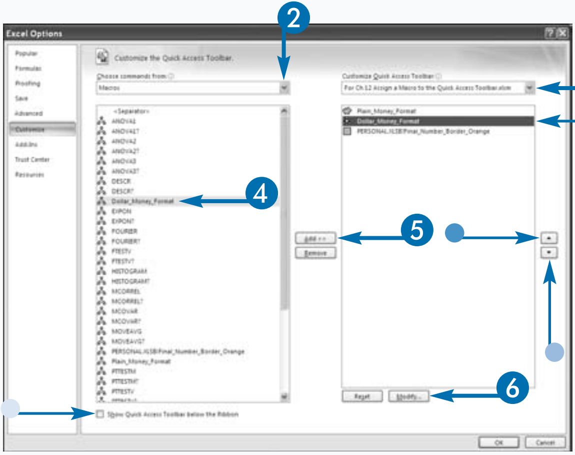
- Click if you want the Quick Access toolbar to appear below the Ribbon (☐ changes to ☑).



1
1
Customize Quick Access Toolbar
New
Open
Save
E-mail
Quick Print
Print Preview
Spelling
Undo
Redo
Sort Ascending
Sort Descending
More Commands...
Show Below the Ribbon
Minimize the Ribbon
Home
Insert
Review
View
Developer
Add-Ins
Visual Basic
Macros
Record
Macro
Code
Properties
View Code
Source
Expansion Packs
Refresh Data
Import
Export
XML
Document Panel
Modify
B7
Sheet1
Sheet2
Sheet3
Ready
Fixed Decimal
100%

B7 =B6

	A	B	C	D	E	F
2			Income Statement			
4			Year 2	Year 3	Year 4	Year 5
5	Net sales		$ 250,000	$ 325,000	$ 450,000	$ 600,000
6	Cost of goods sold	150,000	150,000	150,000	150,000	150,000
7	Gross profit on sales	50,000.00	100,000.00	175,000.00	300,000.00	450,000.00
8	Expenses	25,000.00	35,000.00	50,000.00	45,000.00	55,000.00
9	Net income	25,000.00	65,000.00	125,000.00	255,000.00	395,000.00



2
3
4
5
6
Excel Options
Popular
Formulas
Proofing
Save
Advanced
Customize
Add-Ins
Trust Center
Resources
Customize the Quick Access Toolbar.
<Separator>
ANOVA1
ANOVA1?
ANOVA2
ANOVA2?
ANOVA3
ANOVA3?
DESCR
DESCR?
Dollar_Money_Format
EXPON
EXPON?
FOURIER
FOURIER?
FTESTV
FTESTV?
HISTOGRAM
HISTOGRAM?
MCORREL
MCORREL?
MCOVAR
MCOVAR?
MOVEAVG
MOVEAVG?
PERSONAL.XLSB!Final_Number_Border_Orange
Plain_Money_Format
PTTESTM
PTTESTM?
PTTESTV
Add >>
Remove
Plain_Money_Format
Dollar_Money_Format
PERSONAL.XLSB!Final_Number_Border_Orange
Reset
Modify...
☐ Show Quick Access Toolbar below the Ribbon
OK
Cancel

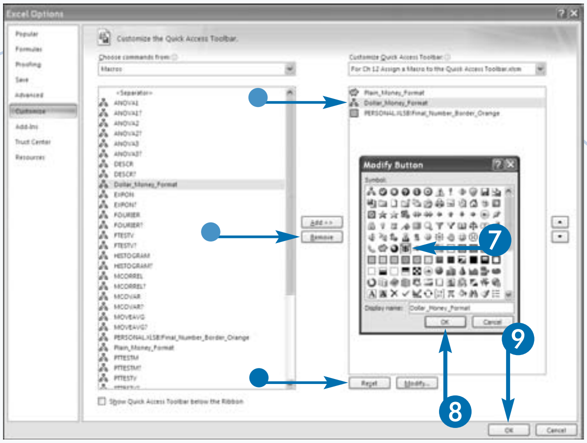
Choose commands from: Macros

Customize Quick Access Toolbar: For Ch.12 Assign a Macro to the Quick Access Toolbar.xlsm

The Modify Button dialog box appears.

7. Click the button you want to use to represent your macro.
8. Click OK to close the Modify Button dialog box.
9. Click OK to close the Excel Options dialog box.

- Click to return the Quick Access toolbar to its default state.
- Click the macro and then click the Remove button to remove a macro.


Excel Options
Popular
Formulas
Proofing
Save
Advanced
Customize
Add-Ins
Trust Center
Resources
Customize the Quick Access Toolbar.
<Separator>
ANOVA1
ANOVA1?
ANOVA2
ANOVA2?
ANOVA3
ANOVA3?
DESCR
DESCR?
Dollar_Money_Format
EXPON
EXPON?
FOURIER
FOURIER?
FTESTV
FTESTV?
HISTOGRAM
HISTOGRAM?
MCORREL
MCORREL?
MCOVAR
MCOVAR?
MOVEAVG
MOVEAVG?
PERSONAL.XLSB!Final_Number_Border_Orange
Plain_Money_Format
PTTESTM
PTTESTM?
PTTESTV
Plain_Money_Format
Dollar_Money_Format
PERSONAL.XLSB!Final_Number_Border_Orange
Add >>
Remove
Modify Button
Symbol:
OK
Cancel
Reset
Modify...
Show Quick Access Toolbar below the Ribbon
OK
Cancel
7
8
9

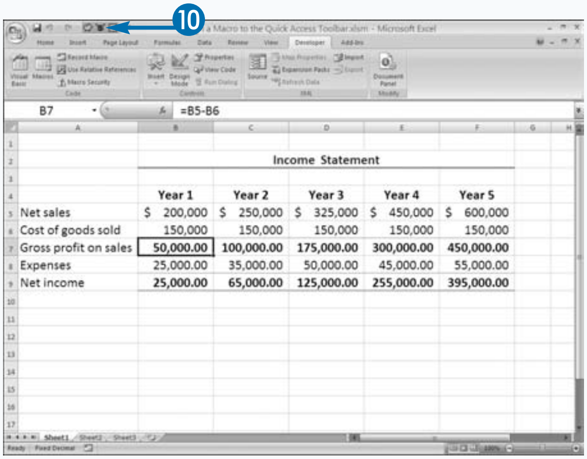
Choose commands from: Macros

Customize Quick Access Toolbar: For Ch 12 Assign a Macro to the Quick Access Toolbar.xlsm

Display name: Dollar_Money_Format

The button appears on the Quick Access toolbar.

10. Click the button to execute your macro.


10
a Macro to the Quick Access Toolbar.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Record Macro
Use Relative References
Macro Security
Visual Basic
Macros
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
Document Panel
Modify
Sheet1
Sheet2
Sheet3
Ready
Fixed Decimal

B7 =B5-B6

	Income Statement				
	Year 1	Year 2	Year 3	Year 4	Year 5
Net sales	$ 200,000	$ 250,000	$ 325,000	$ 450,000	$ 600,000
Cost of goods sold	150,000	150,000	150,000	150,000	150,000
Gross profit on sales	50,000.00	100,000.00	175,000.00	300,000.00	450,000.00
Expenses	25,000.00	35,000.00	50,000.00	45,000.00	55,000.00
Net income	25,000.00	65,000.00	125,000.00	255,000.00	395,000.00

Extra

You can add commands you frequently use to the Quick Access toolbar. Click the Microsoft Office button. A menu appears. Click the Excel Options button located in the bottom-right corner. The Excel Options dialog box appears. Click Customize. The Customize the Quick Access Toolbar page appears. Click the down arrow next to the Choose Commands From field and select All Commands. Click the command you want to add to the Quick Access toolbar and then click the Add button. Click OK. Excel returns you to your workbook, and the command you chose appears on the Quick Access toolbar.

You can add commands you cannot find in the Ribbon by choosing Commands Not in Ribbon in the Choose Commands From field. If a command from a previous version of Excel is not in the Ribbon, you may find it listed under Commands Not in the Ribbon. For example, in previous versions you could format your documents quickly by using AutoFormat. Excel 2007 uses styles, but you can still access AutoFormat through the Commands Not in Ribbon feature.

Delete a Macro

You can delete macros you no longer need by clicking the Delete button in the Macro dialog box. Because the Macro dialog box only displays macros in open workbooks, the workbook that contains the macro must be open before you can delete it.

The Personal Macro Workbook stores macros you want to make available to all workbooks. Excel creates the Personal Macro Workbook when you choose to store your first macro in it. After Excel creates the Personal Macro Workbook, the workbook opens as a hidden file every time you open Excel. To learn more about storing macros in the Personal Macro Workbook, see the section, "Record a Macro."

If your macro is in a hidden workbook such as the Personal Macro Workbook, you must unhide the workbook before you can delete the macro. If you try to delete a macro from the Personal Macro Workbook prior to unhiding it, Excel displays the following message: "Cannot edit a macro on a hidden workbook, Unhide the workbook using the Unhide command." You can unhide the Personal Macro Workbook and other hidden workbooks by executing the Unhide command on the View tab.

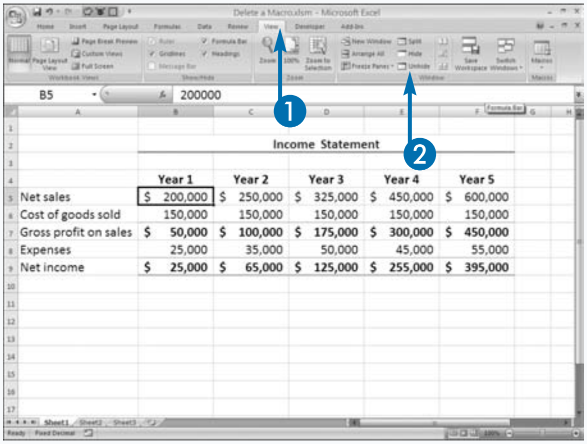
If you unhide the Personal Macro Workbook, make sure you hide it again using the Hide command on the View tab after you delete the macros. Hiding the workbook prevents you from making inadvertent changes to it.

You cannot undo the deletion process, but if you delete a macro by mistake, you can close the workbook without saving. Of course, if you close without saving, you will lose all of the work you have done since saving. Your only other alternative is to re-create the macro.

Delete a Macro

UNHIDE A WORKBOOK

1. Click the View tab.
2. Click Unhide in the Window group.



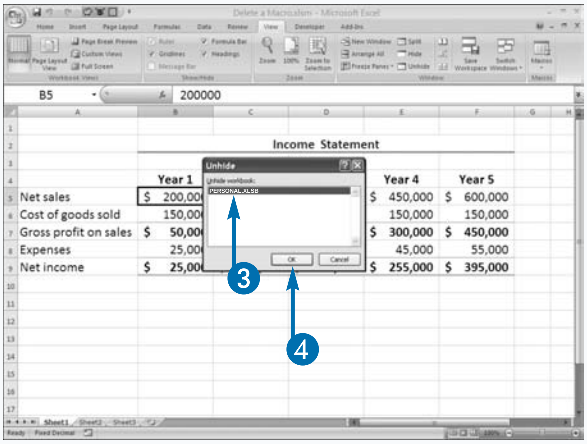
B5 200000

	Income Statement				
	Year 1	Year 2	Year 3	Year 4	Year 5
Net sales	$ 200,000	$ 250,000	$ 325,000	$ 450,000	$ 600,000
Cost of goods sold	150,000	150,000	150,000	150,000	150,000
Gross profit on sales	$ 50,000	$ 100,000	$ 175,000	$ 300,000	$ 450,000
Expenses	25,000	35,000	50,000	45,000	55,000
Net income	$ 25,000	$ 65,000	$ 125,000	$ 255,000	$ 395,000

The Unhide dialog box appears.

3. Click the workbook you want to unhide.
4. Click OK.

Excel unhides the workbook.

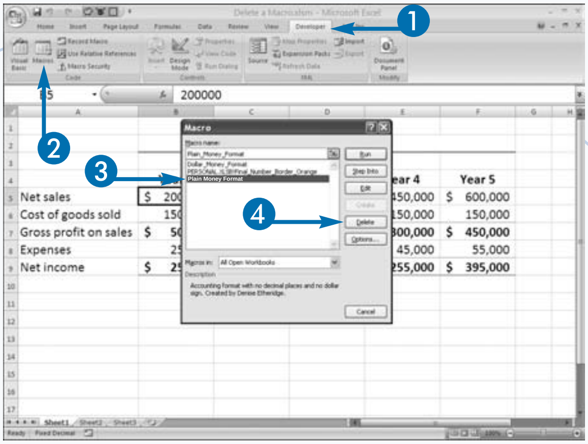


Unhide workbook:
PERSONAL.XLSB

DELETE A MACRO

1. Click the Developer tab.
2. Click Macros in the Code group.

   The Macro dialog box appears.
3. Click the macro you want to delete.
4. Click Delete.

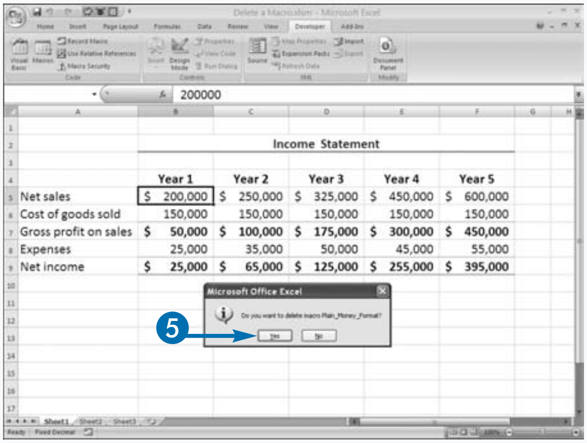

200000
Macro
Macro name:
Plain_Money_Format
Dollar_Money_Format
PERSONAL.XLSB!Final_Number_Border_Orange
Plain Money Format
Run
Step Into
Edit
Create
Delete
Options...
Macros in: All Open Workbooks
Cancel
1
2
3
4

Description: Accounting format with no decimal places and no dollar sign. Created by Denise Etheridge.

A message box appears, asking you to confirm that you want to delete the macro.

5. Click Yes.

   Excel deletes the macro.


200000
Microsoft Office Excel
Yes
No
5

Income Statement

	Year 1	Year 2	Year 3	Year 4	Year 5
Net sales	$ 200,000	$ 250,000	$ 325,000	$ 450,000	$ 600,000
Cost of goods sold	150,000	150,000	150,000	150,000	150,000
Gross profit on sales	$ 50,000	$ 100,000	$ 175,000	$ 300,000	$ 450,000
Expenses	25,000	35,000	50,000	45,000	55,000
Net income	$ 25,000	$ 65,000	$ 125,000	$ 255,000	$ 395,000

Do you want to delete macro Plain_Money_Format?

Extra

Typically, you do not share the Personal Macro Workbook with other users. Excel creates a different Personal Macro Workbook for each username on a computer. If you have multiple users on your computer with different usernames, Excel creates a different Personal Macro Workbook for each of them. You can copy a Personal Macro Workbook from one user to another. The Personal Macro Workbook is stored in the XLStart folder and is named PERSONAL.XLSB. In Windows XP, you can usually find the XLStart folder by following this path: C:\Documents and Settings*username*\Application Data\Microsoft\Excel\XLStart. In Windows Vista, you can usually find the XLStart folder by following this path: C:\Users\username\Application Data\Microsoft\Excel\XLStart.

Each user can only have one PERSONAL.XLSB file. If a user already has a Personal Macro Workbook, you should rename the old PERSONAL.XLSB file and place the new PERSONAL.XLSB file in the user's XLStart folder. All files stored in the XLStart folder open when you open Excel, and so both files become available each time the user opens Excel. If you have other files you want to open when you open Excel, place them in the XLStart folder.

Add a Form Control to a Worksheet

You can add controls to a worksheet to make it easier to enter data into a cell. Form controls can help users who are not familiar with Excel and can increase the accuracy of data entry by limiting a user's options. For example, you can add check boxes to your worksheet so it looks like a paper form. You can also add a list box from which users can select an entry.

Excel provides nine controls you can add to a worksheet. You add controls by selecting the control you want from the Forms Control menu. After you add a control, you can adjust its size by dragging the side or corner handles. When you add a control or right-click a control to edit, you are in design mode. In design mode, you can modify the properties and size of the control, but you cannot test its functionality.

When you place a control on a worksheet, it sits on top of the worksheet. You can size it so it appears to be located in a cell, but controls are separate from cells and you can place them anywhere on the worksheet. A control can cover any portion of a cell or range of cells.

After you add controls to a worksheet, you can assign them values. See the section, "Assign Values to a Form Control," for more information on assigning control values. Form control options are located on the Developer tab. See the section, "Introducing Macros," to learn how to display the Developer tab.

Add a Form Control to a Worksheet

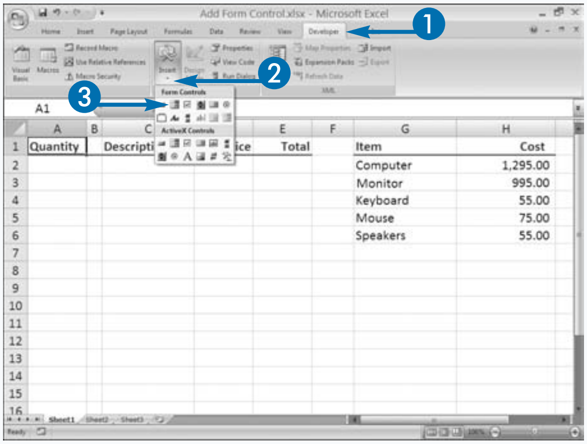
1. Click the Developer tab.

Note: *See the section, "Introducing Macros," to learn how to display the Developer tab.*

2. Click Insert in the Controls group.

The Forms Control menu appears.

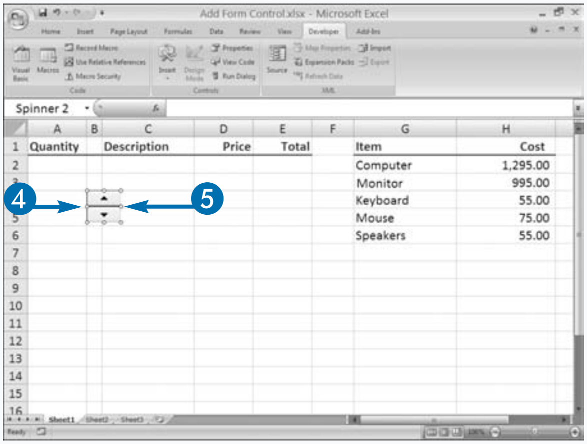
3. Click to select the control you want to add.


Add Form Control.xlsx - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Visual Basic
Macros
Record Macro
Use Relative References
Macro Security
Insert
Design Mode
Properties
View Code
Run Dialog
Map Properties
Import
Expansion Packs
Export
Refresh Data
XML
Form Controls
ActiveX Controls
A1
1
2
3
Sheet1
Sheet2
Sheet3
Ready

Quantity	Description	Price	Total	Item	Cost
				Computer	1,295.00
				Monitor	995.00
				Keyboard	55.00
				Mouse	75.00
				Speakers	55.00

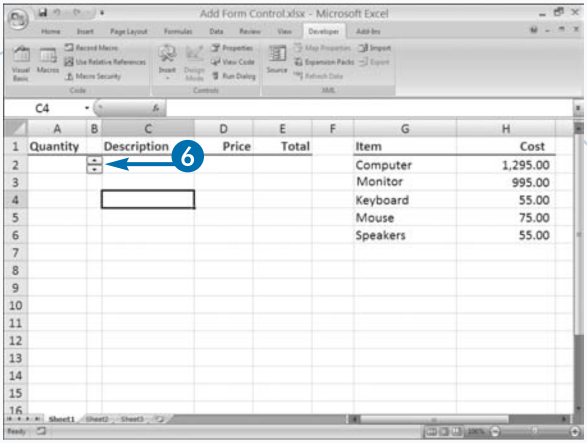
4. Drag the cursor to create the control.

5. Drag the handles on the sides and corners to adjust the size.


Add Form Control.xlsx - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Visual Basic
Macros
Record Macro
Use Relative References
Macro Security
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Import
Expansion Packs
Export
Refresh Data
XML
Spinner 2
4
5
Sheet1
Sheet2
Sheet3
Ready

Quantity	Description	Price	Total	Item	Cost
				Computer	1,295.00
				Monitor	995.00
				Keyboard	55.00
				Mouse	75.00
				Speakers	55.00

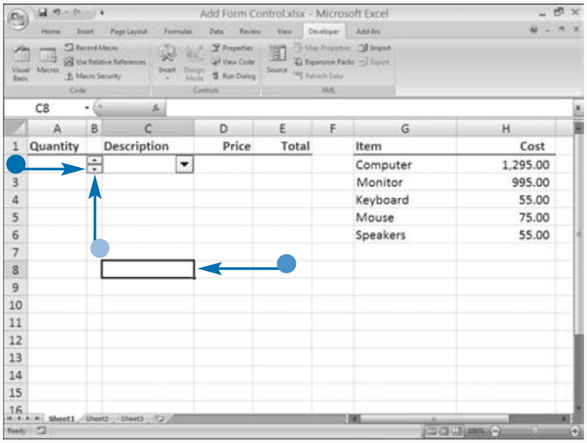
⑥ Place your pointer on the border of a control and drag the control to change its location.


Add Form Control.xlsx - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
C4
6
Sheet1
Sheet2
Sheet3
Ready

	A	B	C	D	E	F	G	H
1	Quantity		Description	Price	Total		Item	Cost
2							Computer	1,295.00
3							Monitor	995.00
4							Keyboard	55.00
5							Mouse	75.00
6							Speakers	55.00

The control appears on the worksheet.

- Right-click the control to place it in design mode.
- To cancel design mode, click any cell in the worksheet.
- To remove a control, right-click the control to select it and then press Delete.


Add Form Control.xlsx - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
C8
Sheet1
Sheet2
Sheet3
Ready

	A	B	C	D	E	F	G	H
1	Quantity		Description	Price	Total		Item	Cost
2							Computer	1,295.00
3							Monitor	995.00
4							Keyboard	55.00
5							Mouse	75.00
6							Speakers	55.00

Extra

You can add the controls listed in the following table to your worksheets.

CONTROL	CONTROL NAME	DESCRIPTION
▭	Button	Runs an associated macro when the user clicks it.
▤	Combo box	Displays a list of items as a menu.
☑	Check box	Selects or deselects an option.
⬍	Spinner	Scrolls up and down through a list of numeric values.
▤	List box	Displays a list of items for selection.
◉	Radio button	Selects one of a group of items when the user clicks it.
⬚	Group box	Places related controls together.
Aa	Label	Provides information about an associated control.
▯	Scroll bar	Increases or decreases a value when the user clicks the arrows or drags the bar.

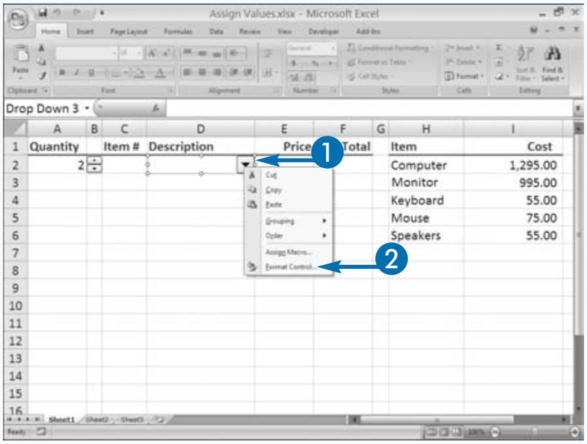
Assign Values to a Form Control

After you add a control to a form, you can assign it the values you want associated with the control. For example, if your worksheet contains a list box, you can assign the list of values that you want to appear when users access the list box. Some controls enable you to define a range of valid numeric values for the control. For example, if you use a spinner, you define the starting value and the maximum value for the control. For combo boxes and list boxes, you can place the options associated with the control in a range of cells. For example, if you use a combo box, you tell Excel the list of values used by the control by entering the range of cells containing the values. The values can be located on another worksheet or even in another workbook, as long as Excel can access the workbook when users view the worksheet that contains the control.

You can link a cell to a control. If you link a cell to a control, the value associated with a user selection becomes the value of the linked cell. If you use a combo box control or list box control, the value in the linked cell is a number that represents the user's selection. Excel assigns the number based on the position of the selected value in your list. If the list contains the values Computer, Monitor, and Keyboard, and the user selects Monitor, the linked cell receives the value 2, because Monitor is second in the list.

With a control such as a check box, you can tell Excel whether you want the option to be initially selected or unselected. Each option — selected or unselected — has a value associated with it.

Assign Values to a Form Control


Assign Values.xlsx - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Drop Down 3
Cut
Copy
Paste
Grouping
Order
Assign Macro...
Format Control...
Sheet1
Sheet2
Sheet3
Ready
1
2

	A	B	C	D	E	F	G	H	I
1	Quantity		Item #	Description	Price	Total		Item	Cost
2	2							Computer	1,295.00
3								Monitor	995.00
4								Keyboard	55.00
5								Mouse	75.00
6								Speakers	55.00

1. Right-click the selected control.

   A menu appears.

2. Click Format Control.

   The Format Object dialog box appears.

3. Click the Control tab.

   The available fields are different, depending on the control type.

   This example uses a list box.

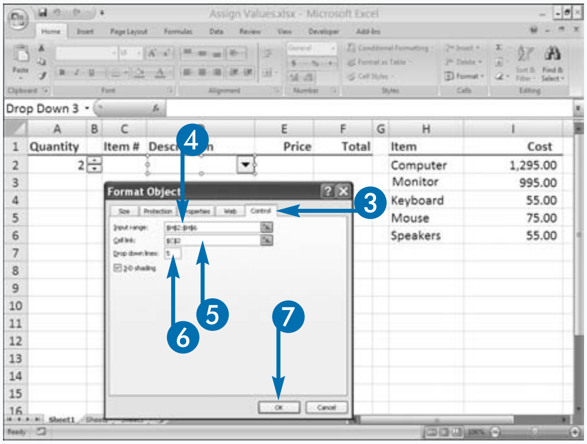
4. Drag to select a range, or type the range that lists the valid values.

5. Click a cell to assign a linked cell.

   The value associated with your selection appears in the linked cell.

6. Type the number of values in your list.

7. Click OK.


Assign Values.xlsx - Microsoft Excel
Drop Down 3
Format Object
Size
Protection
Properties
Web
Control
OK
Cancel
Sheet1
Ready
3
4
5
6
7

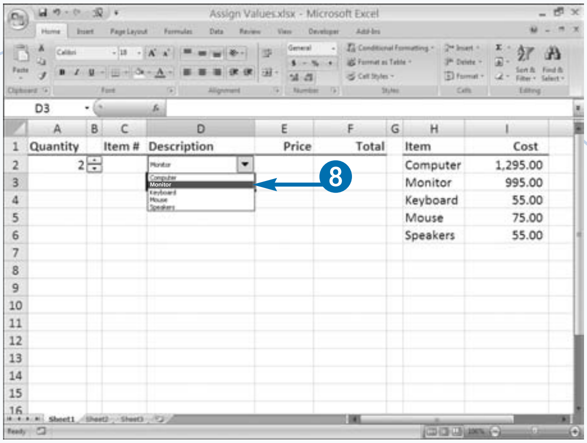
Input range: $H$2:$H$6

Cell link: $C$2

Drop down lines: 5

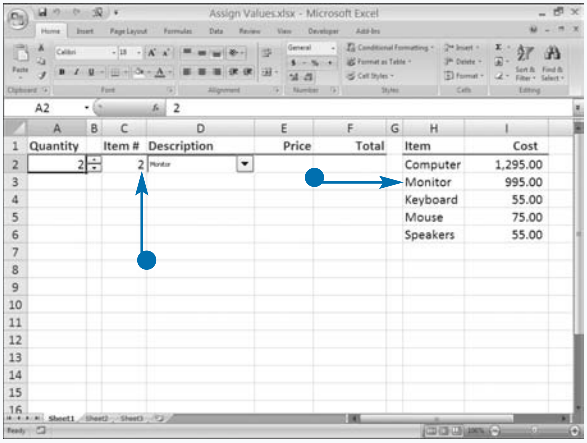
☑ 3-D shading

8 Select the desired control value.


Assign Values.xlsx - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
D3
Sheet1
Sheet2
Sheet3
Ready
8
Computer
Monitor
Keyboard
Mouse
Speakers

	A	B	C	D	E	F	G	H	I
1	Quantity		Item #	Description	Price	Total		Item	Cost
2	2			Monitor				Computer	1,295.00
3								Monitor	995.00
4								Keyboard	55.00
5								Mouse	75.00
6								Speakers	55.00

- Excel places a numeric value representing the control selection in the linked cell.


Assign Values.xlsx - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
A2
2
Sheet1
Sheet2
Sheet3
Ready

	A	B	C	D	E	F	G	H	I
1	Quantity		Item #	Description	Price	Total		Item	Cost
2	2		2	Monitor				Computer	1,295.00
3								Monitor	995.00
4								Keyboard	55.00
5								Mouse	75.00
6								Speakers	55.00

Apply It

When working with a value selected from a list box or combo box control, you may want to use that selection to set the value of another cell. For example, assume you have the following Excel list in cells H2:I4.

Example:

Computer	$1295
Monitor	$995
Keyboard	$55

You can use the `Index` function to determine the price, based on the equipment selection. For example, if the user selects Monitor from the control, Excel places a value of 2 in the linked cell. If you want users to find the cost of the selection, you type a formula similar to the following, assuming that C2 is the linked cell:

Example:

```
=INDEX($H$2:$1$4, C2, 2)
```

The Index function actually creates an array of the Excel list and uses the control selection to determine which element in the array to return, in this case the price, The function uses three arguments: Array, Row_num, and Column_num.

Add a Macro to a Form Control

You can assign a macro to any form control on a worksheet. For example, if a user clicks a radio button control, you can have Excel add a postage amount to an invoice.

You can create one macro for each control on a worksheet. You create a macro either by recording a series of keystrokes or by writing a VBA procedure in the Visual Basic Editor. When you select the Assign Macro menu option, Excel automatically creates a new macro with the name of the control followed by an underscore and an event name, such as _Click. Excel assigns the control name to the control when you add it to your worksheet. For example, the first OptionButton control you add to a worksheet is named OptionButton1. If you create a macro for the option button, Excel gives the macro the name OptionButton1_Click.

The portion of the macro name following the underscore character corresponds to an action, commonly referred to as an *event*. For example, with an OptionButton control, the user clicks the radio button to select the option, and so the event is Click. If you create a macro for a combo box control, Excel assigns Change to the name of the event because you want to execute the macro when the value of the control changes. The event extension tells Excel to monitor the control and execute the macro whenever a user clicks the control.

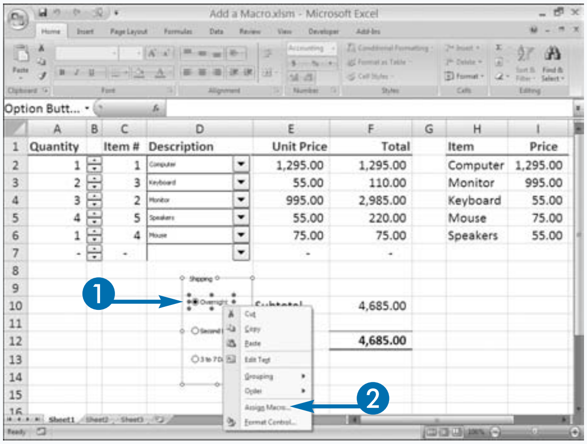
No matter which option you select — recording or writing VBA — Excel assigns the same name to the macro.

Add a Macro to a Form Control

① Right-click your control.

A menu appears.

② Click Assign Macro.


Add a Macro.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Option Butt...
Shipping
Overnight
Second Day
3 to 7 Day
Cut
Copy
Paste
Edit Text
Grouping
Order
Assign Macro...
Format Control...
Sheet1
Sheet2
Sheet3
Ready
1
2

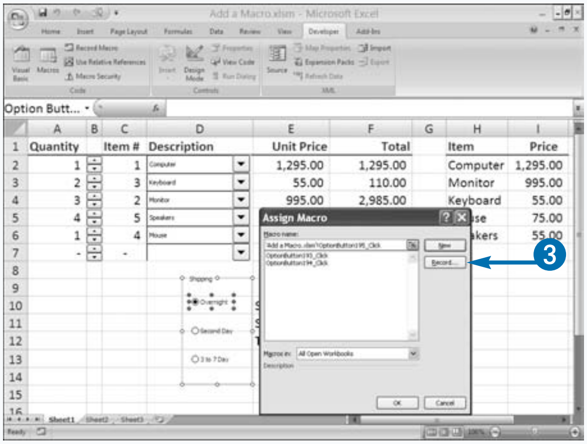
	A	B	C	D	E	F	G	H	I
1	Quantity		Item #	Description	Unit Price	Total		Item	Price
2	1		1	Computer	1,295.00	1,295.00		Computer	1,295.00
3	2		3	Keyboard	55.00	110.00		Monitor	995.00
4	3		2	Monitor	995.00	2,985.00		Keyboard	55.00
5	4		5	Speakers	55.00	220.00		Mouse	75.00
6	1		4	Mouse	75.00	75.00		Speakers	55.00
7	-		-		-	-			
10					Subtotal	4,685.00			
12						4,685.00			

The Assign Macro dialog box appears.

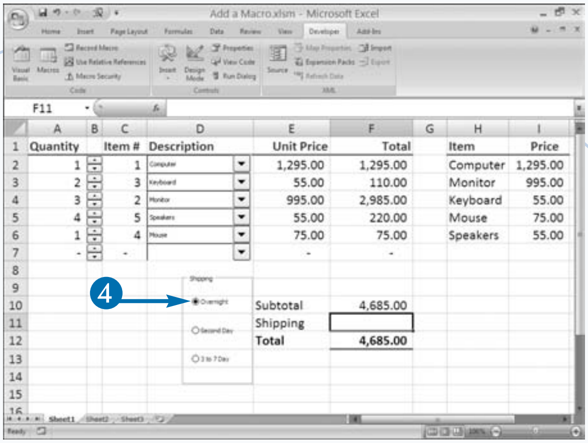
Excel assigns a default macro name for the selected control.

③ Click Record and then record your macro.

Note: *See the section, "Record a Macro," for more information.*


Add a Macro.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Visual Basic
Macros
Record Macro
Use Relative References
Macro Security
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
Option Butt...
Assign Macro
Macro name:
New
Record...
Macros in:
All Open Workbooks
Description
OK
Cancel
Shipping
Overnight
Second Day
3 to 7 Day
Sheet1
Sheet2
Sheet3
Ready
3

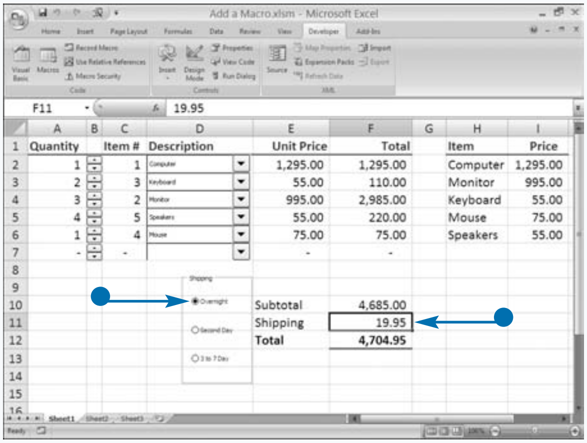
④ Click the control with the assigned macro.


Add a Macro.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Visual Basic
Macros
Record Macro
Use Relative References
Macro Security
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
F11
Shipping
● Overnight
○ Second Day
○ 3 to 7 Day
4
Sheet1
Sheet2
Sheet3
Ready

	A	B	C	D	E	F	G	H	I
1	Quantity		Item #	Description	Unit Price	Total		Item	Price
2	1		1	Computer	1,295.00	1,295.00		Computer	1,295.00
3	2		3	Keyboard	55.00	110.00		Monitor	995.00
4	3		2	Monitor	995.00	2,985.00		Keyboard	55.00
5	4		5	Speakers	55.00	220.00		Mouse	75.00
6	1		4	Mouse	75.00	75.00		Speakers	55.00
7	-		-		-	-			
10					Subtotal	4,685.00			
11					Shipping				
12					Total	4,685.00			

Excel executes the associated macro.

- In this example, Excel assigns postage to the invoice.


Add a Macro.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Visual Basic
Macros
Record Macro
Use Relative References
Macro Security
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
F11
Shipping
● Overnight
○ Second Day
○ 3 to 7 Day
Sheet1
Sheet2
Sheet3
Ready

F11 19.95

	A	B	C	D	E	F	G	H	I
1	Quantity		Item #	Description	Unit Price	Total		Item	Price
2	1		1	Computer	1,295.00	1,295.00		Computer	1,295.00
3	2		3	Keyboard	55.00	110.00		Monitor	995.00
4	3		2	Monitor	995.00	2,985.00		Keyboard	55.00
5	4		5	Speakers	55.00	220.00		Mouse	75.00
6	1		4	Mouse	75.00	75.00		Speakers	55.00
7	-		-		-	-			
10					Subtotal	4,685.00			
11					Shipping	19.95			
12					Total	4,704.95			

Extra

The macros you assign to a control only execute when the corresponding event occurs for the control. For example, you may have a macro assigned to a control that computes the total amount to be paid when the user clicks the control. If you change the values needed to compute the total amount after a user clicks the control, Excel does not update the total until the user clicks the control again.

If you no longer want a macro to be assigned to a control, right-click the control and then click the Assign Macro option. In the Assign Macro dialog box, clear the macro name from the Macro Name field and then click OK. Excel removes the macro assignment from the control, but the macro remains as part of the workbook. To remove the macro from the workbook, click the View tab and then click Macros in the Macros group to display the Macro dialog box. Select the macro you want to delete and then click Delete.

Introducing the Visual Basic Editor

View of the Visual Basic Editor

Ⓐ Project Explorer

The Project Explorer lists all projects. The VBE considers each open workbook and each add-in a project. Microsoft Office arranges projects in the Project Explorer in a tree-like structure. Click plus (+) to show more information. Click minus (–) to show less information. To display the Project Explorer, click View ➔ Project Explorer.

Ⓑ Code Window

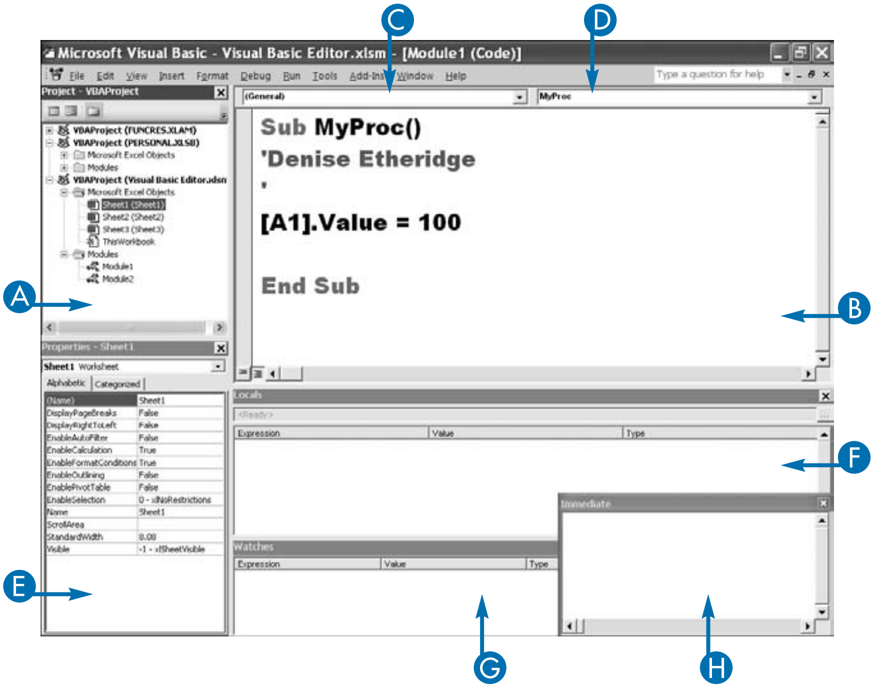
Use the Code window to write, edit, and display VBA code. Every VBA object has a Code window that stores the code associated with the object. In the Project Explorer, double-click an object's name to see the associated code. To display the Code window, click View ➔ Code.

Ⓒ Object List Box

The Object List box lists the objects associated with a form.

Ⓓ Procedure List Box

The Procedure List box lists the procedures associated with the selected object.



Microsoft Visual Basic - Visual Basic Editor.xlsm - [Module1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Type a question for help
Project - VBAProject
VBAProject (FUNCRES.XLAM)
VBAProject (PERSONAL.XLSB)
Microsoft Excel Objects
Modules
VBAProject (Visual Basic Editor.xlsn
Microsoft Excel Objects
Sheet1 (Sheet1)
Sheet2 (Sheet2)
Sheet3 (Sheet3)
ThisWorkbook
Modules
Module1
Module2
Properties - Sheet1
Sheet1 Worksheet
Alphabetic
Categorized
(General)
MyProc
Locals
<Ready>
Expression
Value
Type
Watches
Expression
Value
Type
Immediate
A
B
C
D
E
F
G
H

```
Sub MyProc()
'Denise Etheridge
'
[A1].Value = 100

End Sub
```

(Name)	Sheet1
DisplayPageBreaks	False
DisplayRightToLeft	False
EnableAutoFilter	False
EnableCalculation	True
EnableFormatConditions	True
EnableOutlining	False
EnablePivotTable	False
EnableSelection	0 - xlNoRestrictions
Name	Sheet1
ScrollArea	
StandardWidth	8.08
Visible	-1 - xlSheetVisible

Ⓔ Properties Window

To select an object, click the object name in Project Explorer. To display the Properties window, click View ➔ Properties Window. Use the Properties window to set the properties associated with the selected object.

Ⓕ Locals Window

Use the Locals window to monitor declared variables. To open the Locals window, click View ➔ Locals Window.

Ⓖ Watches Window

Use the Watches window to monitor properties and variables. To display the Watches window, click View ➔ Watch Window.

Ⓗ Immediate Window

The Immediate window returns the results of statements you type into the Immediate window. To display the Immediate window, click View ➔ Immediate Window.

The Visual Basic Editor

Excel provides two ways to create a macro: You can record a macro or you can type Visual Basic for Applications (VBA) code into the Visual Basic Editor (VBE). The VBE is a separate application you use to write and edit VBA code. You can access the VBE through all Microsoft Office applications, including Excel.

You access the VBE by clicking the Visual Basic button on the Developer tab in the Code group, or by pressing Alt+F11. Inside the VBE, you can reposition windows to create the development environment you prefer. You can use the View menu to tell Excel which windows and toolbars you want visible.

The Project Explorer Window

The Project Explorer resembles the treelike structure used by the Windows Explorer folders pane. When you open the VBE, the VBE opens a VBA project for each open Excel workbook. The VBE names each project VBAProject (*workbook name*). Under the project name, the VBE lists the workbook and each worksheet in the workbook.

When you record a macro, you can choose to store it in the Personal Macro Workbook. Once you have stored a macro in the Personal Macro Workbook, the Personal Macro Workbook opens as a hidden file whenever you run Excel. If the Personal Macro Workbook is open, you can see it listed as a project in the Project Explorer window.

Modules

VBA executes procedures in response to a system action or an action performed by a user. A module is a set of procedures that Excel can execute. The VBE stores each macro you create or record as a procedure in a module. The Project Explorer lists each module a project contains. You can add modules by using the steps outlined later in this chapter. When you double-click a module name in the Project Explorer, the contents of the module appear in the Code window. Use the Procedure List box to select the procedure you want to view.

Properties Window

You use VBA code to manipulate objects. Workbooks and worksheets are examples of objects. A property is an attribute of an object. VBA uses attributes to define such things as the name, color, location, or size of an object. The Properties window displays the properties associated with the selected object. To select an object, you click the object name in the Project Explorer window. A module has only one property: its name. Hence, if you select a module, the only property that you see in the Properties window is the module name. Sheets have many properties, and if you select a sheet, you can view and modify the many sheet properties.

To change the properties associated with an object, you simply click the field beside the property and make the desired changes. Some property fields, such as Name, require you to type a value. Other fields have drop-down lists from which you can select the appropriate value. Some properties are read-only. You cannot change read-only properties.

Activate the Visual Basic Editor

There are two ways to create a macro. One way is to use the macro recorder to record the steps needed to perform the action. The other way is to create the steps by typing the VBA code into the Code window of the VBE. When you use the macro recorder, Excel automatically creates the VBA code for you. You can use the VBE to edit macros you have created with the macro recorder. Often, it is convenient to use a combination of the two methods to create your VBA code: You record part of the VBA code and then you use the VBE to augment or modify your code.

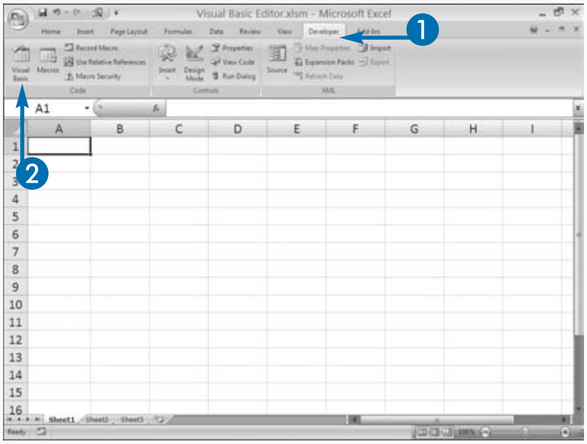
You can use several methods to activate the VBE: You can press Alt+F11 while in Excel; click the Visual Basic button in the Code group on the Developer tab; or click the Edit button in the Macro dialog box. When the VBE is open, you can open the Code window by pressing Ctrl+R.

If you create your macros using the macro recorder, Excel defines each macro you create as a procedure and stores each procedure in a module. The VBE lists modules in the Project Explorer under the workbook in which they are located.

If the Personal Macro Workbook, Personal.xlsm, contains macros, the project for the Personal.xlsm workbook opens when you access the VBE. You can view and modify all of the macros in the Personal Macro Workbook. See Chapter 1 to learn more about the Personal Macro Workbook.

Activate the Visual Basic Editor

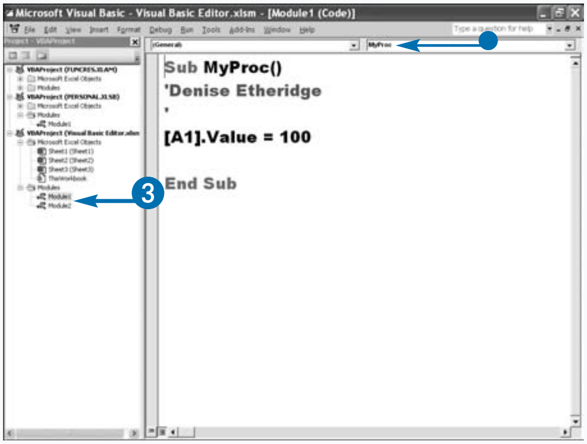
OPEN THE VBE BY USING THE RIBBON


Visual Basic Editor.xlsm - Microsoft Excel
Developer
Visual Basic
Macros
Record Macro
Use Relative References
Macro Security
Code
A1
1
2

① Click the Developer tab.

Note: *See Chapter 1 to learn how to display the Developer tab.*

② Click Visual Basic in the Code group.


Microsoft Visual Basic - Visual Basic Editor.xlsm - [Module1 (Code)]
(General)
MyProc
3

```
Sub MyProc()
'Denise Etheridge
'
[A1].Value = 100

End Sub
```

The VBE appears, with the Window layout you last used.

③ Double-click a module name.

Excel shows the macro in the Code window.

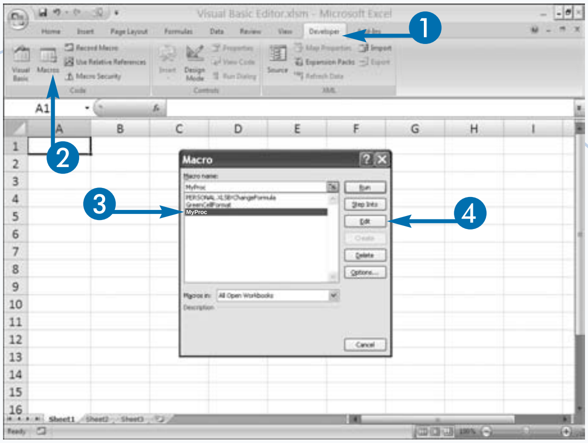
- If you placed more than one macro in the module, you can click here and then select the macro you want to see.

Press Alt+F11 to return to Excel.

OPEN THE VBE FROM THE MACRO DIALOG BOX

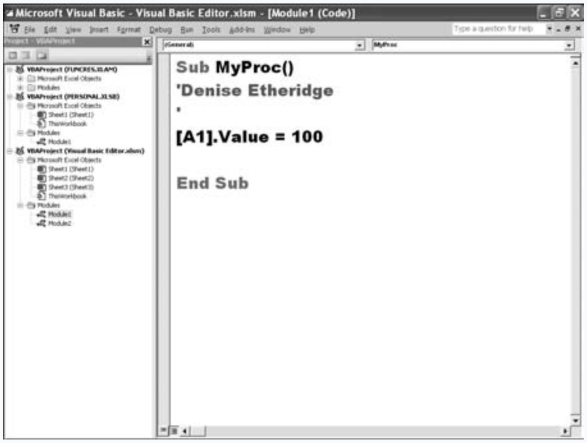
1. Click the Developer tab.
2. Click Macros in the Code group.

   The Macro dialog box appears.
3. Click the macro you want to edit.
4. Click Edit.



Visual Basic Editor.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Visual Basic
Macros
Record Macro
Use Relative References
Macro Security
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
A1
Macro
Macro name:
MyProc
PERSONAL.XLSB!ChangeFormula
GreenCellFormat
MyProc
Run
Step Into
Edit
Create
Delete
Options...
Macros in:
All Open Workbooks
Description
Cancel
Sheet1
Sheet2
Sheet3
Ready
1
2
3
4

The VBE appears, with the code for the selected macro in the Code window.



Microsoft Visual Basic - Visual Basic Editor.xlsm - [Module1 (Code)]
File
Edit
View
Insert
Format
Debug
Run
Tools
Add-Ins
Window
Help
Type a question for help
Project - VBAProject
(General)
MyProc

```
Sub MyProc()
'Denise Etheridge
'
[A1].Value = 100

End Sub
```

Extra

To make the VBE easier to navigate, Microsoft provides shortcut keys. These shortcuts work when the VBE window is open.

SHORTCUT KEY	DESCRIPTION
F1	When you select an item in the Code window and then press F1, the VBE displays online help for the item you selected.
F4	Press F4 to switch to the Property window and display the properties for the selected object. If the Property window is not open, the VBE opens it in the location where you last viewed it.
F7	You select an object by clicking it in the Project Explorer. When you press F7, the Code window for the selected object appears on top of all other Code windows.
Ctrl+G	When you press Ctrl+G, the VBE displays the Immediate window.
Ctrl+R	When you press Ctrl+R, you switch to the Project Explorer. If the Project Explorer window is not open, the VBE opens it in the location where you last viewed it.
Alt+F11	When you press Alt+F11, you toggle between the VBE and Excel.

Open Visual Basic Editor Windows

The VBE contains several windows you can use when developing macros. Microsoft provides a basic window setup; however, you can rearrange, resize, remove, and add windows. The most commonly used windows are the Project Explorer, the Properties window, and the Code window. You may also find the Immediate window useful for quickly testing a statement before adding it to your code.

You can select which windows to display and where to display them. The View menu lists the available VBE windows. When you select a window from the menu, that window appears in the location where you last placed it. For example, if you placed the Project Explorer window in the upper-left corner during your previous session, the Project Explorer window reopens in the upper-left corner.

You can move windows by using the standard drag-and-drop feature found in all Windows applications. You can resize a window by dragging its edges.

You can also attach windows to specific locations in the VBE by using the docking feature. When you dock a window, it becomes part of another window attached at the specified location. If you set a window to dock, Excel docks it in the location you specified each time it opens. You can only dock windows on the top, bottom, left edge, or right edge of the screen, application window, or another dockable window. Docking a window does not mean that the window always appears in the VBE.

You can have multiple Code windows open at the same time. You can view multiple Code windows simultaneously by tiling or cascading them.

Understanding the Visual Basic Editor Windows

DISPLAY A WINDOW

① Click View.

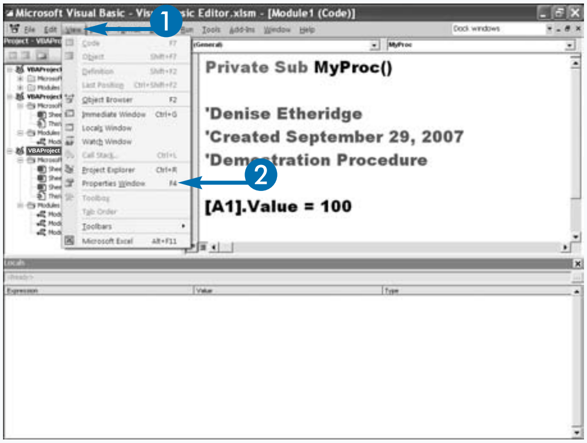
② Click the window you want to display.

You can choose from the Immediate Window, Locals Window, Watch Window, Project Explorer, or Properties Window.

The selected window appears in the last viewed location.

You can click and drag the window to a new location.

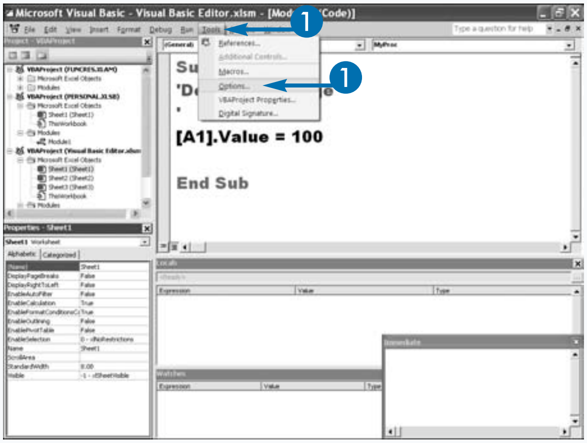
You can close a window by clicking the Close box or by right-clicking and selecting Hide.


Microsoft Visual Basic - Vis sic Editor.xlsm - [Module1 (Code)]
File
Edit
View
Run
Tools
Add-Ins
Window
Help
Dock windows
Code F7
Object Shift+F7
Definition Shift+F2
Last Position Ctrl+Shift+F2
Object Browser F2
Immediate Window Ctrl+G
Locals Window
Watch Window
Call Stack... Ctrl+L
Project Explorer Ctrl+R
Properties Window F4
Toolbox
Tab Order
Toolbars
Microsoft Excel Alt+F11
(General)
MyProc
Locals
Expression
Value
Type
1
2

```
Private Sub MyProc()

'Denise Etheridge
'Created September 29, 2007
'Dem  tration Procedure

[A1].Value = 100
```

DOCK INDIVIDUAL WINDOWS

① Click Tools ➔ Options.


Microsoft Visual Basic - Visual Basic Editor.xlsm - [Mod (Code)]
File
Edit
View
Insert
Format
Debug
Run
Tools
Type a question for help
Project - VBAProject
References...
Additional Controls...
Macros...
Options...
VBAProject Properties...
Digital Signature...
(General)
MyProc
Properties - Sheet1
Sheet1 Worksheet
Alphabetic
Categorized
Locals
Watches
Immediate
Expression
Value
Type
1
1

```
Su
'D
'

[A1].Value = 100

End Sub
```

The Options dialog box appears.

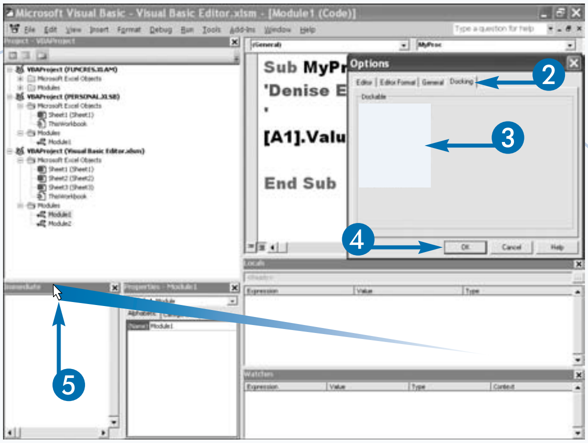
2 Click the Docking tab.

3 Click the windows you want to dock (☐ changes to ☑).

4 Click OK.

5 Dock the window by clicking and dragging it to an edge.

Excel moves the window to its new location.


Microsoft Visual Basic - Visual Basic Editor.xlsm - [Module1 (Code)]
Options
Editor
Editor Format
General
Docking
Dockable
OK
Cancel
Help
Immediate
Properties - Module1
Locals
Watches
2
3
4
5

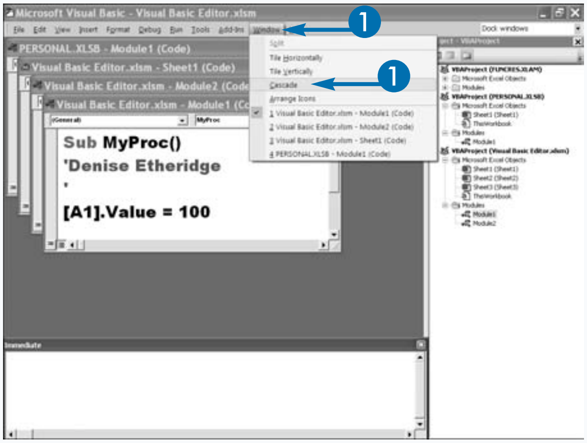
```
Sub MyPr
'Denise E
'
[A1].Valu

End Sub
```

DISPLAY CODE WINDOWS

1 Click Window and then click a tiling option.

You can select Tile Horizontally, Tile Vertically, or Cascade.

The VBE displays your Code windows either tiled or cascading.


Microsoft Visual Basic - Visual Basic Editor.xlsm
PERSONAL.XLSB - Module1 (Code)
Visual Basic Editor.xlsm - Sheet1 (Code)
Visual Basic Editor.xlsm - Module2 (Code)
Visual Basic Editor.xlsm - Module1 (Code)
Split
Tile Horizontally
Tile Vertically
Cascade
Arrange Icons
1 Visual Basic Editor.xlsm - Module1 (Code)
2 Visual Basic Editor.xlsm - Module2 (Code)
3 Visual Basic Editor.xlsm - Sheet1 (Code)
4 PERSONAL.XLSB - Module1 (Code)
Immediate
1
1

```
Sub MyProc()
'Denise Etheridge
'
[A1].Value = 100
```

Extra

You can move windows around in the VBE by using the same techniques you use with all Microsoft Windows programs. To move a window, click the title bar and drag it to the desired location. To resize a window, click a corner of the window and drag it to the desired size.

To free up space, you can hide any of the VBE windows. To hide a window, right-click anywhere in the window. In the menu that appears, click Hide.

When you have many lines of code, you may not be able to see all of it at the same time. If you click Window ➔ Split, the VBE splits the Code window so you can view different parts of your code simultaneously. When you split your window, the VBE creates two windows with the same code. You can manipulate each window independent of the other so you can see different parts of your code at the same time.

Set Properties for a Project

You can set the properties, such as the project name and the lock status, for each project you can view in the Project Explorer window. When you lock a project, the project is password-protected so that only people who know the password can view and modify the contents of the project. You can set both the project name and the password in the Project Properties dialog box.

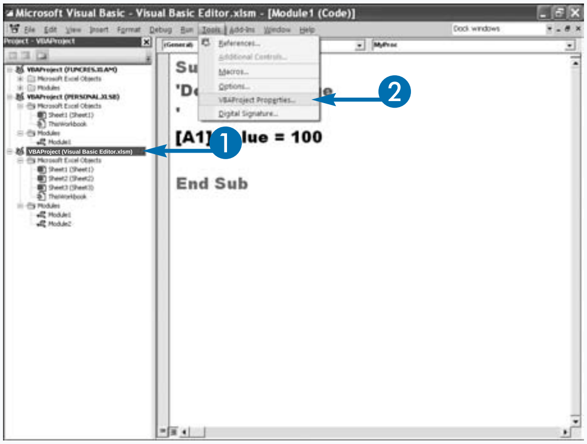
Excel considers each open workbook to be a project when you access the VBE. By default, the VBE gives each project the name VBA Project (*WorkbookName*). You can change the name of a project. Changing the project's name can help distinguish between projects, especially if you have several workbooks open simultaneously. For example, if you have a workbook that contains macros that perform a specific type of action, you can give your project a name that makes its purpose readily apparent.

If you plan to distribute your workbook to other users, you may want to consider password-protecting your project. If a project is password-protected, the user must enter the password to view or modify any portion of the project. This step can protect VBA code that you do not want others to view or modify. Password-protecting the project does not lock the corresponding Excel workbook, but it can help keep others from viewing and changing your VBA code. Password-protection does not make your code completely secure; there are password recovery utilities on the market that anyone can use to recover your password.

Set Properties for a Project

CHANGE A PROJECT NAME

1. Click the project name you want to change.
2. Click Tools ➔ *Project Name* Properties.

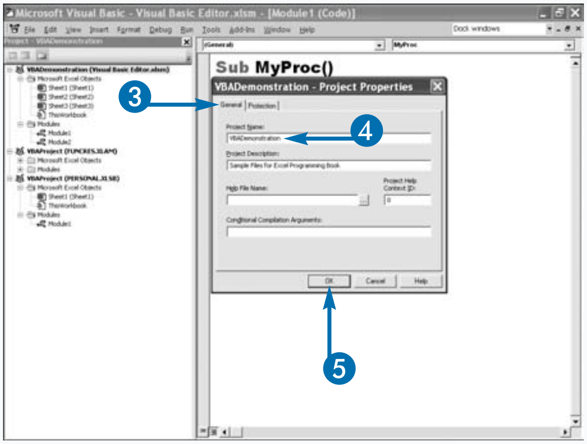

Microsoft Visual Basic - Visual Basic Editor.xlsm - [Module1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Dock windows
Project - VBAProject
VBAProject (FUNCRES.XLAM)
Microsoft Excel Objects
Modules
VBAProject (PERSONAL.XLSB)
Microsoft Excel Objects
Sheet1 (Sheet1)
ThisWorkbook
Modules
Module1
VBAProject (Visual Basic Editor.xlsm)
Microsoft Excel Objects
Sheet1 (Sheet1)
Sheet2 (Sheet2)
Sheet3 (Sheet3)
ThisWorkbook
Modules
Module1
Module2
(General)
MyProc
References...
Additional Controls...
Macros...
Options...
VBAProject Properties...
Digital Signature...
1
2

```
Su
'De
'
[A1]  lue = 100

End Sub
```

The *Project Name* Properties dialog box appears.

3. Click the General tab.
4. Type the desired project name.
5. Click OK.

The project name changes within the Project Explorer window.


Microsoft Visual Basic - Visual Basic Editor.xlsm - [Module1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Dock windows
Project - VBADemonstration
VBADemonstration (Visual Basic Editor.xlsm)
Microsoft Excel Objects
Sheet1 (Sheet1)
Sheet2 (Sheet2)
Sheet3 (Sheet3)
ThisWorkbook
Modules
Module1
Module2
VBAProject (FUNCRES.XLAM)
Microsoft Excel Objects
Modules
VBAProject (PERSONAL.XLSB)
Microsoft Excel Objects
Sheet1 (Sheet1)
ThisWorkbook
Modules
Module1
(General)
MyProc
VBADemonstration - Project Properties
General
Protection
OK
Cancel
Help
3
4
5

```
Sub MyProc()
```

Project Name: VBADemonstration

Project Description: Sample Files for Excel Programming Book

Help File Name:

Project Help Context ID: 0

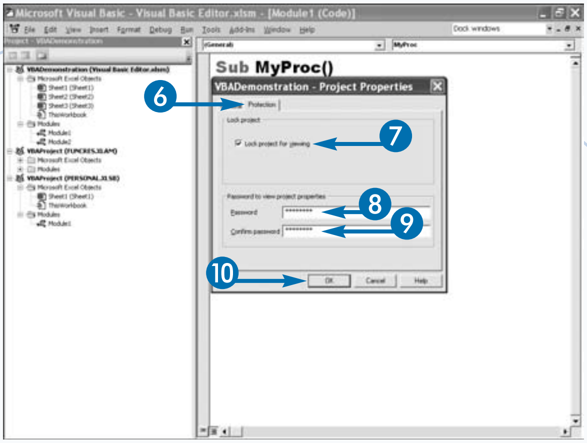
Conditional Compilation Arguments:

LOCK A PROJECT FROM EDITING

6. Click the Protection tab.
7. Click the Lock Project for Viewing option (☐ changes to ☑).
8. Type the password required to unlock the project.
9. Type the password again.
10. Click OK.

Excel locks your project.

The next time you open the workbook, you will not be able to view the code unless you know the password.


Microsoft Visual Basic - Visual Basic Editor.xlsm - [Module1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Dock windows
Project - VBADemonstration
VBADemonstration (Visual Basic Editor.xlsm)
Microsoft Excel Objects
Sheet1 (Sheet1)
Sheet2 (Sheet2)
Sheet3 (Sheet3)
ThisWorkbook
Modules
Module1
Module2
VBAProject (FUNCRES.XLAM)
Microsoft Excel Objects
Modules
VBAProject (PERSONAL.XLSB)
Microsoft Excel Objects
Sheet1 (Sheet1)
ThisWorkbook
Modules
Module1
(General)
MyProc
VBADemonstration - Project Properties
Protection
Lock project
Password to view project properties
OK
Cancel
Help
6
7
8
9
10

```
Sub MyProc()
```

☑ Lock project for viewing

Password: *********

Confirm password: *********

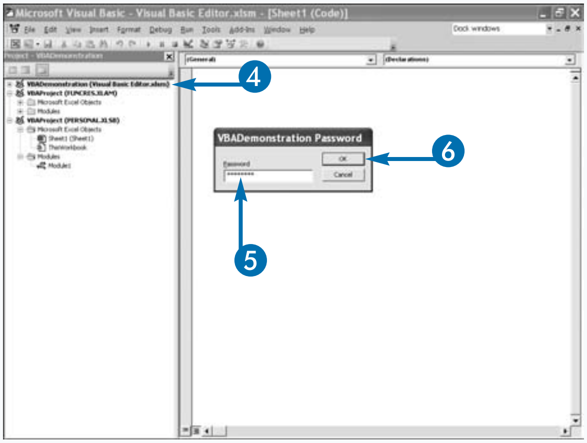
OPEN A LOCKED PROJECT

1. Save and close your workbook.
2. Open your workbook.
3. Press Alt+F11 to open the VBE.
4. Double-click the locked project.

The Password dialog box appears.

5. Type the password.
6. Click OK.

Excel opens your project.


Microsoft Visual Basic - Visual Basic Editor.xlsm - [Sheet1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Dock windows
Project - VBADemonstration
VBADemonstration (Visual Basic Editor.xlsm)
VBAProject (FUNCRES.XLAM)
Microsoft Excel Objects
Modules
VBAProject (PERSONAL.XLSB)
Microsoft Excel Objects
Sheet1 (Sheet1)
ThisWorkbook
Modules
Module1
(General)
(Declarations)
VBADemonstration Password
OK
Cancel
4
5
6

Password: *********

Extra

You can create forms to enable users to interact with macros. If you have multiple workbooks open in Excel, you can copy modules and forms by using the Project Explorer window. To copy an object, click the object and drag it to another project. When you release the mouse button, the VBE creates a copy of the selected module or form in the specified project. By default, the VBE gives the copied module the same name as the module in the original project. When you copy an object to another project, if one already exists with that name, the VBE renames the object by adding a number to the end of the name. For example, if you copy Module2 to a project that already contains a Module2, the copied module name becomes Module21. If you have a Module21, the VBE names the copied object Module22.

Set Display Options for the Code Window

As you develop your VBA code, you will spend a lot of time interacting with the Code window. You can use the Editor Format tab in the Options dialog box to adjust many aspects of the Code window. These adjustments can make it easier for you to create and debug your VBA code.

You can enter many different categories of text into the Code window. For example, you can use comments to annotate your code. By using the Format Editor, you can adjust the foreground, background, and indicator color for each type of text listed in the Color Text list. When you use colors, it is easier for you to locate a particular type of text when you are creating or debugging your code.

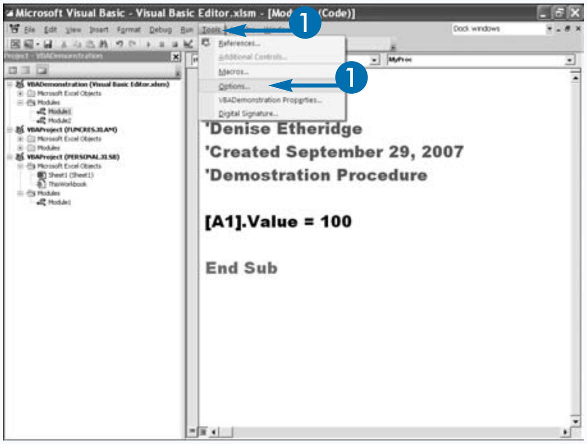
You can use the Font field to select from the fonts installed on your computer. When working with VBA code, you may find code easier to read if you use a fixed-width font such as Courier New. With a fixed-width font, the characters in the code align vertically, making it easier to detect any spacing problems in your code. Use the Size field to set the size of your font.

The Margin Indicator Bar check box indicates whether a vertical indicator bar appears in the margin when you debug your code. Make sure this option remains selected so you can use the vertical indicator bar to spot the appropriate line of code when you are debugging. The VBE places symbols in the vertical indicator bar to indicate errors and break points. See Chapter 8 for more information on debugging.

As you make changes to the font settings for each of the formatting types, Excel shows you a sample of the changes in the Sample box.

Set Display Options for the Code Window

① Click Tools ➔ Options.


Microsoft Visual Basic - Visual Basic Editor.xlsm - [Mod (Code)]
References...
Additional Controls...
Macros...
Options...
VBADemonstration Properties...
Digital Signature...
1
1

```
'Denise Etheridge
'Created September 29, 2007
'Demostration Procedure

[A1].Value = 100

End Sub
```

The Options dialog box appears.

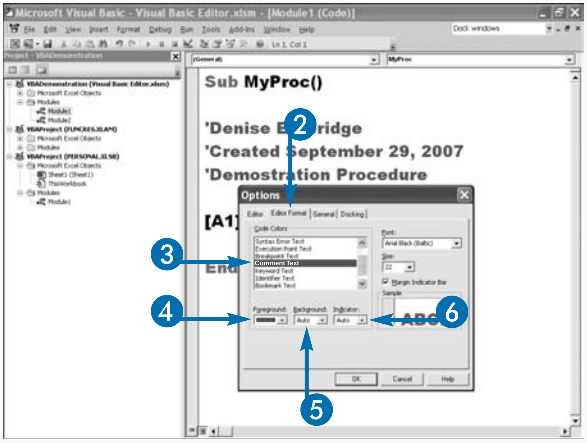
② Click the Editor Format tab.

③ Click the type of text for which you want to change the settings.

④ Click here and select a foreground color.

⑤ Click here and select a background color.

⑥ Click here and select an indicator color.


Microsoft Visual Basic - Visual Basic Editor.xlsm - [Module1 (Code)]
Options
Editor
Editor Format
General
Docking
Code Colors
Syntax Error Text
Execution Point Text
Breakpoint Text
Comment Text
Keyword Text
Identifier Text
Bookmark Text
Sample
ABC
OK
Cancel
Help
2
3
4
5
6

```
Sub MyProc()

'Denise E ridge
'Created September 29, 2007
'Demostration Procedure
```

Font: Arial Black (Baltic)

Size: 22

☑ Margin Indicator Bar

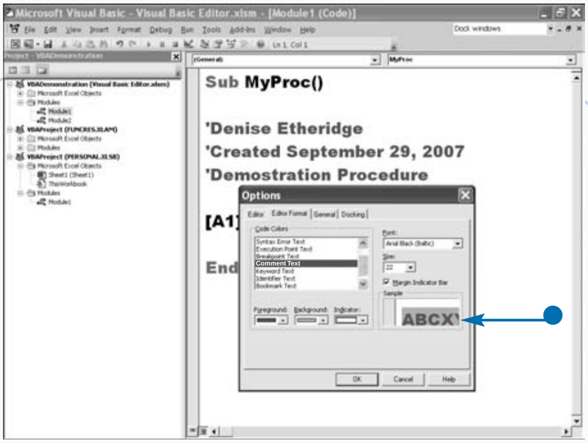
Foreground:

Background: Auto

Indicator: Auto

Excel sets the foreground, background, and indicator colors for the category you selected.

- The selection appears in the Sample box.

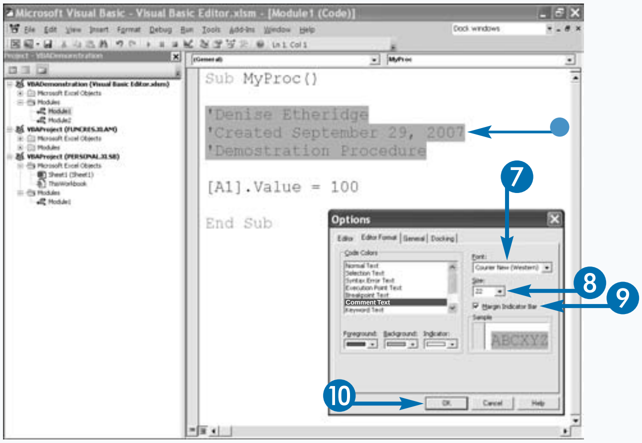


```
Sub MyProc()

'Denise Etheridge
'Created September 29, 2007
'Demonstration Procedure

[A1

End
```

Microsoft Visual Basic - Visual Basic Editor.xlsm - [Module1 (Code)]
Options
ABCX

7. Click here and select a font.
8. Click here and select a font size.
9. Make sure the Margin Indicator Bar check box remains selected.
10. Click OK.

- The text in the Code window changes to reflect your modifications.



```
Sub MyProc()

'Denise Etheridge
'Created September 29, 2007
'Demonstration Procedure

[A1].Value = 100

End Sub
```

Microsoft Visual Basic - Visual Basic Editor.xlsm - [Module1 (Code)]
Options
7
8
9
10
ABCXYZ
OK
Cancel
Help

Extra

You can use the Editor tab in the Options dialog box to set the options shown in the table that follows. Click Tools and then click Options to access the Options dialog box.

OPTION	FUNCTION
Auto Syntax Check	Allows the VBE to check the syntax of each line of code immediately after you type it.
Require Variable Declaration	Requires explicit variable declarations within all modules. See Chapter 3 for more information.
Auto List Member	As you type your code, you see a reminder of the next logical value for completing the current statement.
Auto Quick Info	Displays information about functions and their parameters as you type.
Auto Data Tips	Displays the current value of a variable when you place your cursor over the variable while in break mode. See Chapter 8 for more information about debugging your VBA code.
Auto Indent	After you set a tab location, all following lines start at the same tab location. You specify the width of the tabs in the Tab Width field. You can set tabs from 1 to 32 spaces apart.

Add a New Module

When you begin writing code, you will use variables to store information. A *string* is a sequence of characters that does not represent a numeric value. A string can consist of letters, numbers, spaces, and punctuation marks. A variable can hold a number, a string, or some other type of information. When you tell VBA exactly what type of information a variable can contain, you are declaring the variable. A *procedure* is a sequence of code that, when executed, performs an action in Excel. When you record a macro, VBA stores it as a procedure. VBA uses modules to store variable declarations and procedures. Whenever you create a new macro by using the macro recorder, VBA places the procedure in a module and associates the module with the project. The VBE considers every open workbook a project.

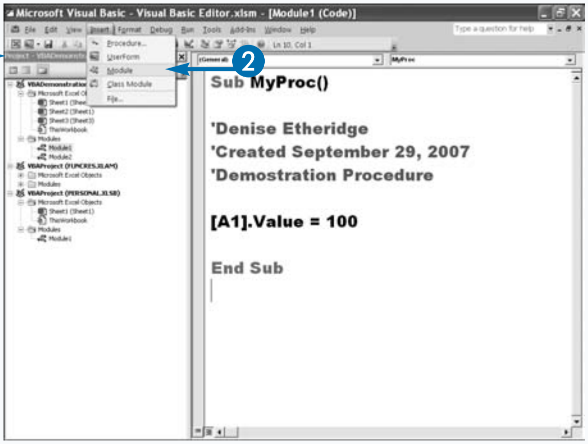
When you type VBA code into the VBE, you place it in a module. You can create a module to store your VBA code. As you add new modules to a project, VBA names them Module#. The VBE assigns numbers to the modules, increasing the number by one each time you add a new module. For example, the VBE names the first module in the project Module1, the second Module2, and so on.

The Project Explorer lists all of the modules in a project. When you add a new module, Excel selects that module in the Project Explorer and creates a blank Code window.

You do not have to create a new module for each procedure you add to a workbook. You can add multiple procedures to the same module.

Add a New Module

1. Click the project to which you want to add a new module.
2. Click Insert ➔ Module.

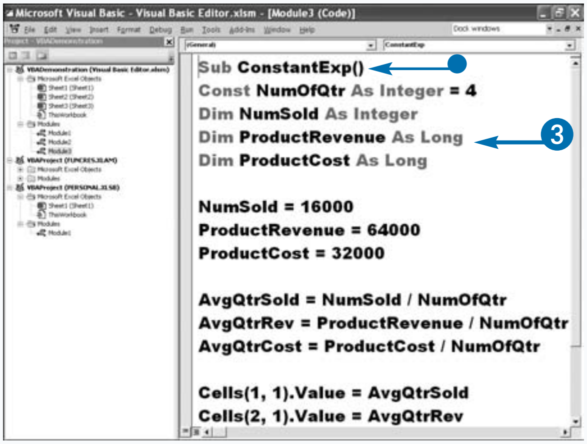

Microsoft Visual Basic - Visual Basic Editor.xlsm - [Module1 (Code)]
Procedure...
UserForm
Module
Class Module
File...
(General)
MyProc
1
2

```
Sub MyProc()

'Denise Etheridge
'Created September 29, 2007
'Demostration Procedure

[A1].Value = 100

End Sub
```

Excel creates a new module and opens the associated Code window.

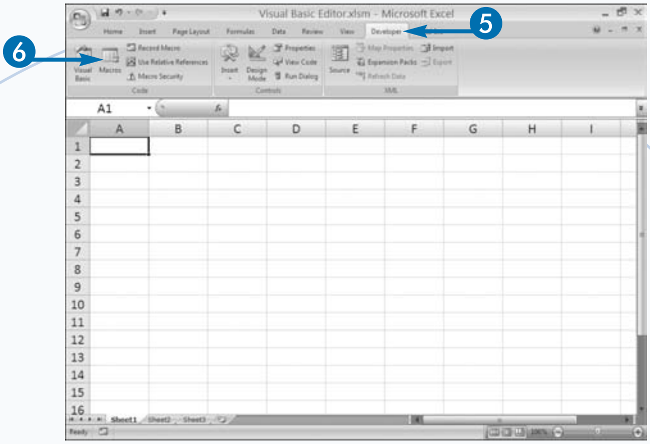
3. Type the code for your macro.

- This is the macro name.

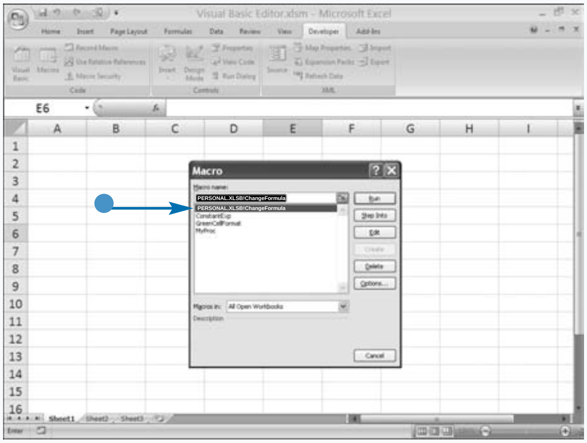

Microsoft Visual Basic - Visual Basic Editor.xlsm - [Module3 (Code)]
(General)
ConstantExp
3

```
Sub ConstantExp()
Const NumOfQtr As Integer = 4
Dim NumSold As Integer
Dim ProductRevenue As Long
Dim ProductCost As Long

NumSold = 16000
ProductRevenue = 64000
ProductCost = 32000

AvgQtrSold = NumSold / NumOfQtr
AvgQtrRev = ProductRevenue / NumOfQtr
AvgQtrCost = ProductCost / NumOfQtr

Cells(1, 1).Value = AvgQtrSold
Cells(2, 1).Value = AvgQtrRev
```

4. Press Alt+F11 to move from the VBE to Excel.
5. Click the Developer tab.
6. Click Macros in the Code Group.


Visual Basic Editor.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Visual Basic
Macros
Record Macro
Use Relative References
Macro Security
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
A1
Sheet1
Sheet2
Sheet3
Ready
5
6

- The Macro dialog box lists all existing macros, including the ones you create in the VBE.


Visual Basic Editor.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
E6
Macro
Macro name:
PERSONAL.XLSB!ChangeFormula
PERSONAL.XLSB!ChangeFormula
ConstantExp
GreenCellFormat
MyProc
Macros in:
All Open Workbooks
Description
Run
Step Into
Edit
Create
Delete
Options...
Cancel
Sheet1
Sheet2
Sheet3
Enter

Extra

You can easily change the name of a module. When you create a new module, the VBE automatically names the module Module#, with the number sequentially following the last module you created — for example, Module1, Module2, and so on. If you have a project with several modules, distinguishing one module from another without reviewing the source code can be difficult. You can rename modules with names that reflect the actions that the contents of the module perform.

Use the Properties window to change the name of a module. In the Project Explorer window, click the name of the module you want to rename. Press F4 to move to the Properties window. Type a new name in the Name field and then press Enter. The name of the module changes on the corresponding node in the Project Explorer window.

Remove a Module

You can remove modules from the VBE. Typically, you remove modules that contain procedures you no longer need. When you attempt to remove a module, the VBE gives you the opportunity to export the module to a file before removing it. If there is any possibility that you will need to use a procedure in that module in the future, exporting the module before removing it is good idea.

Exporting a module creates a file with a .bas extension. These files are text files, and you can open and read them with any text editor.

Once you have exported a module, you can use the Import File dialog box to import the module back into the project from which you exported it or into another project. If you have modules you want to share with other programmers, you can export them so the other programmers can import them. When you import a module file, the VBE tries to assign it the same name as the original module. If a module already exists with that name, the VBE adds a sequential number to the end of the module name. Therefore, if you named the original module Module1 and a Module1 exists in the project, Excel names the imported module Module11.

When you remove a module that contains code used by a macro, you can no longer access the macro. If you remove a module that contains code referenced by a procedure in another module, an error message appears when you run the code.

When you delete macros within Excel, Excel removes the corresponding VBA code. If a VBA module does not contain any code, Excel removes the entire module.

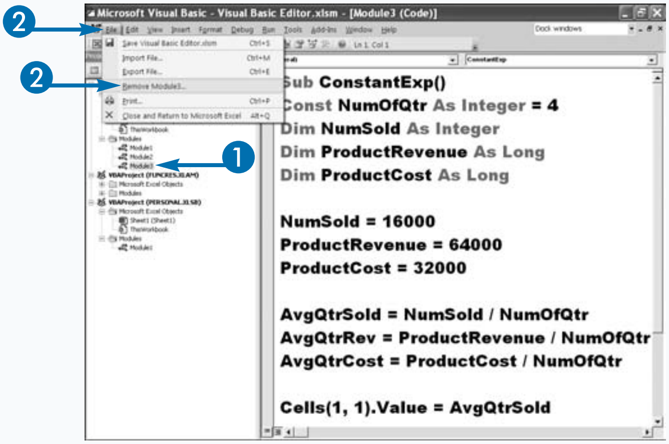
Remove a Module

① Click the module you want to remove.

If the Project Explorer is not visible, press Ctrl+R to display it.

② Click File ➔ Remove *Module Name*, where Module Name is the name of the selected module.

The Remove command always contains the name of the selected module.

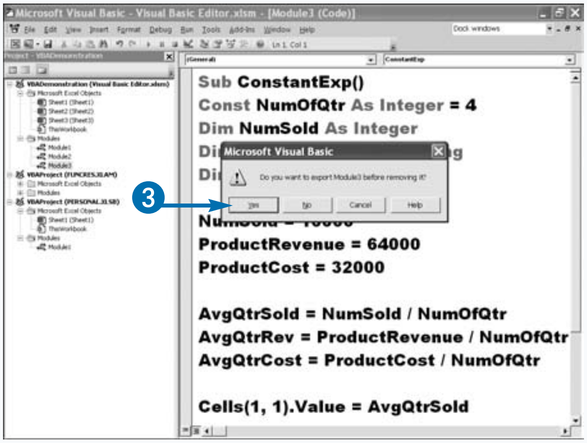

Microsoft Visual Basic - Visual Basic Editor.xlsm - [Module3 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Save Visual Basic Editor.xlsm Ctrl+S
Import File... Ctrl+M
Export File... Ctrl+E
Remove Module3...
Print... Ctrl+P
Close and Return to Microsoft Excel Alt+Q
ConstantExp
2
2
1

```
ub ConstantExp()
onst NumOfQtr As Integer = 4
Dim NumSold As Integer
Dim ProductRevenue As Long
Dim ProductCost As Long

NumSold = 16000
ProductRevenue = 64000
ProductCost = 32000

AvgQtrSold = NumSold / NumOfQtr
AvgQtrRev = ProductRevenue / NumOfQtr
AvgQtrCost = ProductCost / NumOfQtr

Cells(1, 1).Value = AvgQtrSold
```

The VBE displays a message, asking whether you want to export the module before removing it.

③ Click Yes to export the module to a file.

Alternatively, click No if you want to delete the module permanently.


Microsoft Visual Basic - Visual Basic Editor.xlsm - [Module3 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
ConstantExp
Microsoft Visual Basic
Yes
No
Cancel
Help
3

Do you want to export Module3 before removing it?

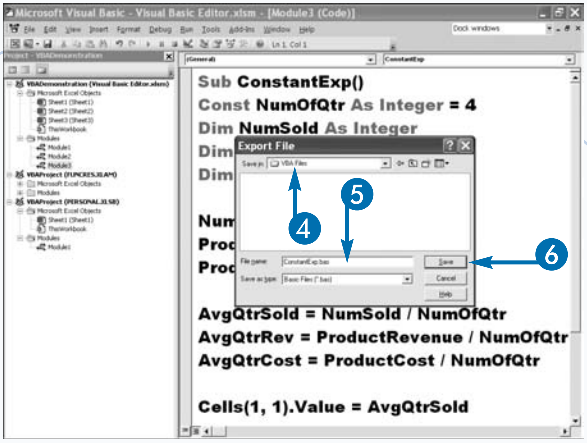
```
Sub ConstantExp()
Const NumOfQtr As Integer = 4
Dim NumSold As Integer
Di                                g
Di

Nu
ProductRevenue = 64000
ProductCost = 32000

AvgQtrSold = NumSold / NumOfQtr
AvgQtrRev = ProductRevenue / NumOfQtr
AvgQtrCost = ProductCost / NumOfQtr

Cells(1, 1).Value = AvgQtrSold
```

The Export File dialog box appears.

④ Click here and select the folder in which you want to save the module code.

⑤ Type a name for the module code.

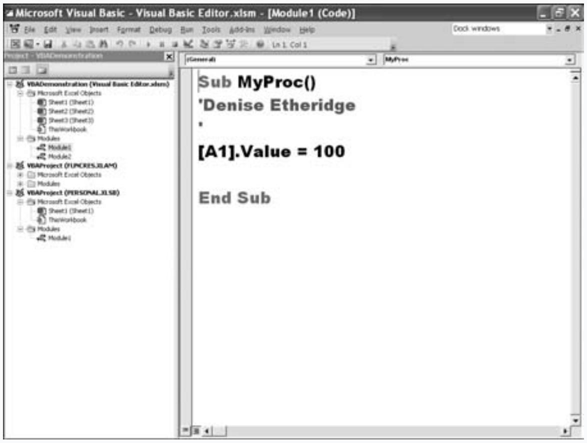
⑥ Click Save.


Microsoft Visual Basic - Visual Basic Editor.xlsm - [Module3 (Code)]
(General)
ConstantExp
Export File
Save
Cancel
Help
4
5
6

```
Sub ConstantExp()
Const NumOfQtr As Integer = 4
Dim NumSold As Integer
Dim
Dim

Num
Proc
Proc

AvgQtrSold = NumSold / NumOfQtr
AvgQtrRev = ProductRevenue / NumOfQtr
AvgQtrCost = ProductCost / NumOfQtr

Cells(1, 1).Value = AvgQtrSold
```

Save in: VBA Files
File name: ConstantExp.bas
Save as type: Basic Files (*.bas)

The VBE removes the module from the project and saves the module in the file you specified.


Microsoft Visual Basic - Visual Basic Editor.xlsm - [Module1 (Code)]
(General)
MyProc

```
Sub MyProc()
'Denise Etheridge
'
[A1].Value = 100

End Sub
```

Extra

You do not need to delete a module to save it as a file. If you want to share your code with other VBA developers, you can simply export the module to a file and then distribute the file. To export a macro, you select the module containing the macro and then click File ➔ Export File. The Export file dialog box appears. In the Save In field, select the folder in which you want to save the file. Type a filename in the File Name field and then click Save.

When you export a module to a file, you can import it into any workbook. To import an exported file, click a project name to select the project into which you want to import the file. Click File ➔ Import File. The Import File dialog box appears. Use the Look In field to locate the folder in which you saved the exported module. Click the filename and then click Open. VBA imports the file.

Hide a Macro

You can hide macros so they do not appear in the Excel Macro dialog box. If you create workbooks you intend to share with others, you may want to hide specific macros within your workbook to ensure that users do not inadvertently delete those macros from your workbook.

Because Excel cannot execute a hidden macro from the Macro dialog box, you need to assign the hidden macro to the Ribbon or have another macro call the macro. When you hide a macro, shortcut keys no longer execute the macro.

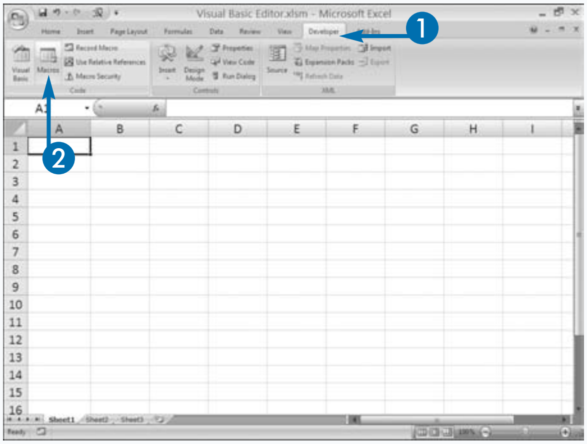
To hide a macro, open the module containing the macro within the VBE and place the Private statement in front of the Sub statement for the procedure. For example, you type the following to hide the ChangeText procedure: `Private Sub ChangeText()`.

Hiding a macro does not prevent users from viewing or modifying the macro in the VBE. If you want to keep users from accessing the macro, you must password-protect the project containing the macro by changing the properties of the project. See the section, "Set Properties for a Project," for the details on setting project properties. Locking the project prevents users from using the VBE to view and modify the VBA code within that project. To open the project, a user must enter the correct password. Locking a project limits user accessibility, but Excel can still execute any macros in the project.

Hide a Macro

① Click the Developer tab.

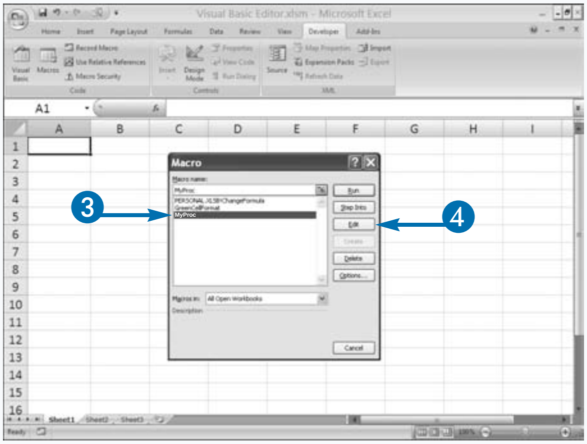
② Click Macros in the Code group.


Visual Basic Editor.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Visual Basic
Macros
Record Macro
Use Relative References
Macro Security
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
A1
Sheet1
Sheet2
Sheet3
Ready
①
②

The Macro dialog box appears.

③ Click the macro you want to hide.

④ Click Edit.


Macro name: MyProc

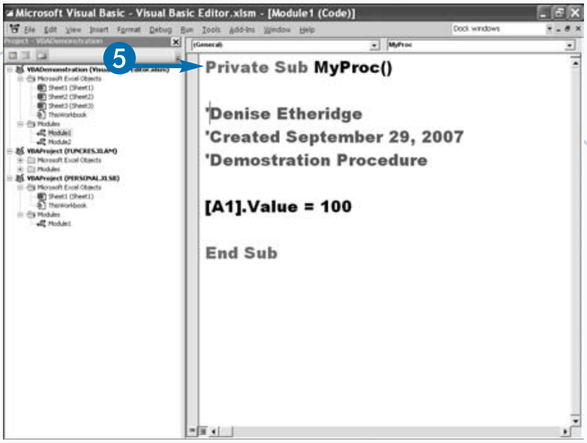
PERSONAL.XLSB!ChangeFormula
GreenCellFormat
MyProc

Macros in: All Open Workbooks

Visual Basic Editor.xlsm - Microsoft Excel
Developer
Macro
Description:
Run
Step Into
Edit
Create
Delete
Options...
Cancel
③
④

The VBE opens to the macro you selected.

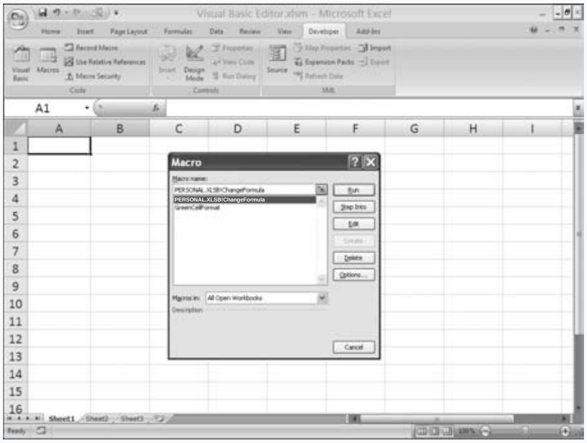
5. Type **Private** before the Sub statement.
6. Press Alt+F11 to return to Excel.


Microsoft Visual Basic - Visual Basic Editor.xlsm - [Module1 (Code)]
5

```
Private Sub MyProc()

'Denise Etheridge
'Created September 29, 2007
'Demostration Procedure

[A1].Value = 100

End Sub
```

7. Repeat steps 1 and 2 to open the Macro dialog box.

The macro no longer displays.


Visual Basic Editor.xlsm - Microsoft Excel
Macro
Run
Step Into
Edit
Create
Delete
Options...
Cancel

Macro name: PERSONAL.XLSB!ChangeFormula

PERSONAL.XLSB!ChangeFormula
GreenCellFormat

Macros in: All Open Workbooks

Extra

You should hide macros that are called by other macros if you do not want the user to be able to execute the macro from the Macro dialog box. For example, you have a macro named ChangeCells that calls another macro named AddCellValues. You can hide the AddCellValues macro so users cannot execute the macro from the Macro dialog box. When you mark a procedure as private by placing the Private statement in front of the Sub statement for the procedure, you can only access the procedure within the same code module. In other words, the hidden macro and the procedure that corresponds to the macro calling the hidden macro must be within the same code module.

To make a hidden macro visible again, you need to access the module containing the corresponding procedure within the VBE and delete the Private statement in front of the Sub statement.

Update a Macro

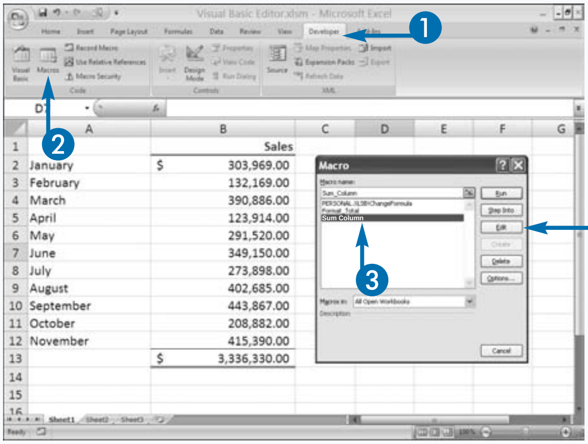
You can update a macro at any time by adding or removing VBA code. After you record a macro, you can record it again to replace it, but you cannot modify it in Excel. The only way to modify your macro is to change the procedure by using the VBE. If you do not know how to read and write the VBA code required for the step you want to add to the macro, this can be quite an undertaking.

Typically, modifying a macro — even one you create with the macro recorder — requires manually specifying the new VBA code you want to add to the macro. You can quickly update an existing macro by recording the code you want to add to the macro and then using the copy and paste features within the VBE to add the new steps to the old macro.

For example, you create a macro that sums the values in a column of cells but you forget to change the formatting of the cell that contains the column total to Currency. You can record a second macro in Excel that formats the column. After you do that, you open the VBE, copy the formatting code you created when you recorded the second macro, and paste it into the procedure for the first macro. When you copy the code, be sure you only copy the portion of the procedure between the Sub and the End Sub statements.

After you copy the code from the second macro into the first macro, you can delete the second macro. You can find out more about deleting macros in Chapter 1.

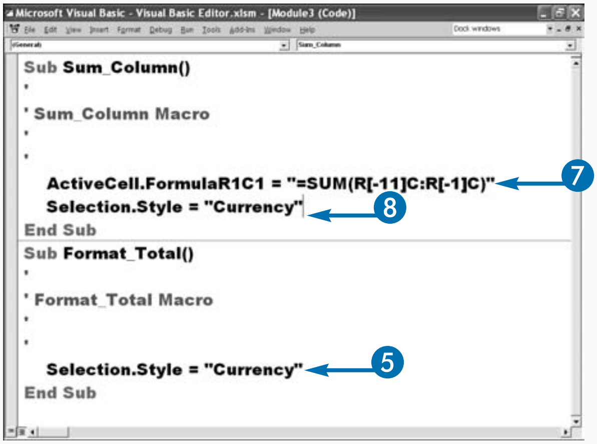
Update a Macro


Visual Basic Editor.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Visual Basic
Macros
Record Macro
Use Relative References
Macro Security
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
D7
Macro
Macro name:
Sum_Column
PERSONAL.XLSB!ChangeFormula
Format_Total
Sum Column
Run
Step Into
Edit
Create
Delete
Options...
Macros in:
All Open Workbooks
Description
Cancel
Sheet1
Sheet2
Sheet3
Ready
100%
1
2
3
4

	A	B	C
1		Sales	
2	January	$ 303,969.00	
3	February	132,169.00	
4	March	390,886.00	
5	April	123,914.00	
6	May	291,520.00	
7	June	349,150.00	
8	July	273,898.00	
9	August	402,685.00	
10	September	443,867.00	
11	October	208,882.00	
12	November	415,390.00	
13		$ 3,336,330.00	

1. Click the Developer tab.
2. Click Macros in the Code group.

   The Macro dialog box appears.
3. Click your original macro.
4. Click Edit.


Microsoft Visual Basic - Visual Basic Editor.xlsm - [Module3 (Code)]
File
Edit
View
Insert
Format
Debug
Run
Tools
Add-Ins
Window
Help
Dock windows
(General)
Sum_Column
7
8
5

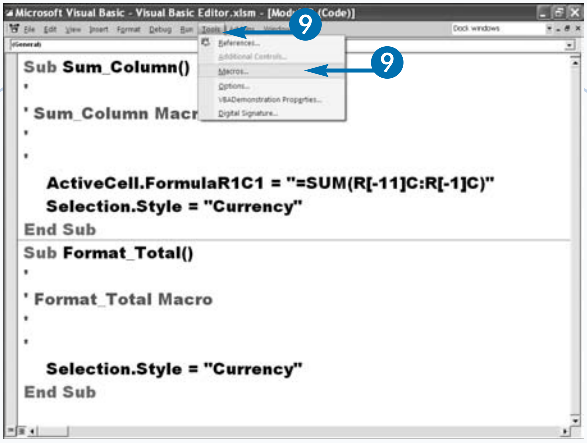
```
Sub Sum_Column()
'
' Sum_Column Macro
'
'
    ActiveCell.FormulaR1C1 = "=SUM(R[-11]C:R[-1]C)"
    Selection.Style = "Currency"
End Sub
Sub Format_Total()
'
' Format_Total Macro
'
'
    Selection.Style = "Currency"
End Sub
```

The VBE appears, and opens to the module that contains your macro.

5. Click and drag to select the code in your second macro.
6. Press Ctrl+C to copy the code.
7. Place your cursor at the end of the last line of code in your original macro and then press Enter.

   The VBE creates a new line.
8. Press Ctrl+V to paste the code.

⑨ Click Tools ➔ Macros.


Microsoft Visual Basic - Visual Basic Editor.xlsm - [Module3 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Dock windows
(General)
References...
Additional Controls...
Macros...
Options...
VBADemonstration Properties...
Digital Signature...
9
9

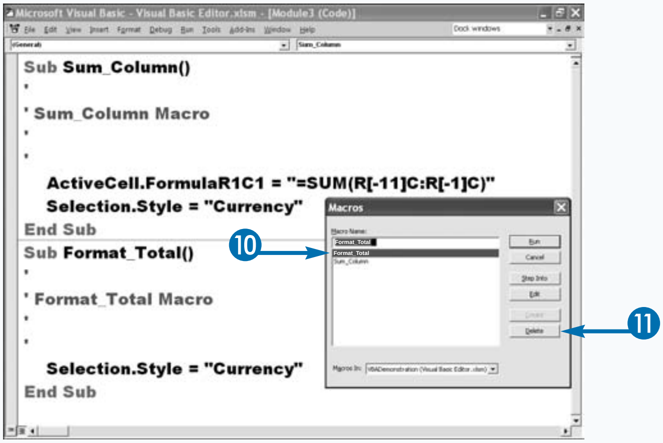
```
Sub Sum_Column()
'
' Sum_Column Macro
'
'
    ActiveCell.FormulaR1C1 = "=SUM(R[-11]C:R[-1]C)"
    Selection.Style = "Currency"
End Sub
Sub Format_Total()
'
' Format_Total Macro
'
'
    Selection.Style = "Currency"
End Sub
```

The Macro dialog box appears.

⑩ Select the second macro.

⑪ Click Delete.

The VBE deletes the macro.


Microsoft Visual Basic - Visual Basic Editor.xlsm - [Module3 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Dock windows
(General)
Sum_Column
Macros
Macro Name:
Format_Total
Format_Total
Sum_Column
Run
Cancel
Step Into
Edit
Create
Delete
Macros In: VBADemonstration (Visual Basic Editor.xlsm)
10
11

```
Sub Sum_Column()
'
' Sum_Column Macro
'
'
    ActiveCell.FormulaR1C1 = "=SUM(R[-11]C:R[-1]C)"
    Selection.Style = "Currency"
End Sub
Sub Format_Total()
'
' Format_Total Macro
'
'
    Selection.Style = "Currency"
End Sub
```

Extra

When you view the VBA code for your macro, you may notice that an apostrophe (') precedes several lines. These are called comment lines. Programmers use comments to provide information about the code, such as what the code does, when it was created, and who coded it. When you use the macro recorder to create a macro, any information you type in the Description box appears as a comment.

Example:

```
Sub MyProc()

'Denise Etheridge
'Created September 29, 2007
'Demonstration Procedure

     [A1].Value = 100

End Sub
```

Create Sub Procedures

A block of VBA code that performs a task is a *procedure*. A *Sub procedure* is a special type of procedure that performs a task but does not return a value. Every time you record a macro, Excel creates a Sub procedure. You can view the Sub procedures in the VBE. You can also use the VBE to create Sub procedures.

Every Sub procedure begins with the key word `Sub` followed by the name of the Sub procedure and parentheses. If the Sub procedure does not take any arguments, the parentheses are empty. If the Sub procedure does take arguments, you place the arguments between the parentheses, separated by commas. Sub procedures end with the key words `End Sub`.

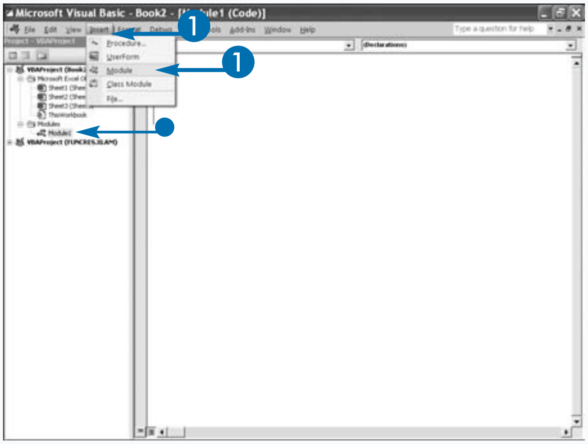
Every Sub procedure must have a name. You can name your Sub procedure anything you want as long as you follow these naming rules: The name must start with a letter. The name can contain only letters, numbers, and underscores and cannot contain any spaces. The name cannot be longer than 255 characters. The name cannot be a cell address; for example, you cannot name your Sub procedure A1. Procedure names in VBA are not case-sensitive. The name of your Sub procedure should describe the function the procedure performs. For example, if your Sub procedure prints a sales report, you might want to name it PrintSalesReport or Print_Sales_Report.

You place Sub procedures inside modules. See Chapter 2 to learn more about modules.

Understanding Sub Procedures

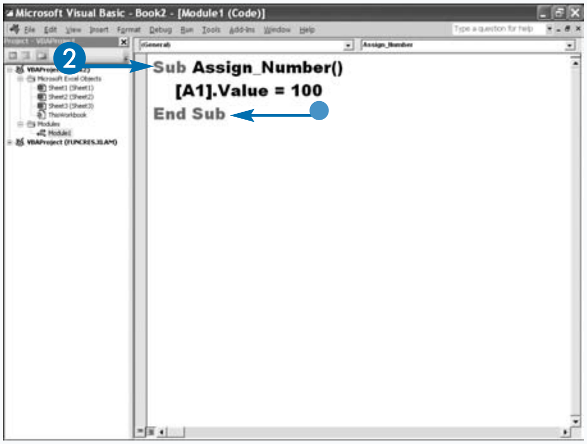
① Click Insert ➔ Module.

- The VBE creates a new module.


Microsoft Visual Basic - Book2 - [Module1 (Code)]
Procedure...
UserForm
Module
Class Module
File...
(Declarations)
1
1

② Type **Sub**.

- The VBE automatically adds the words End Sub.


Microsoft Visual Basic - Book2 - [Module1 (Code)]
(General)
Assign_Number
2

```
Sub Assign_Number()
    [A1].Value = 100
End Sub
```

③ Type your procedure name.

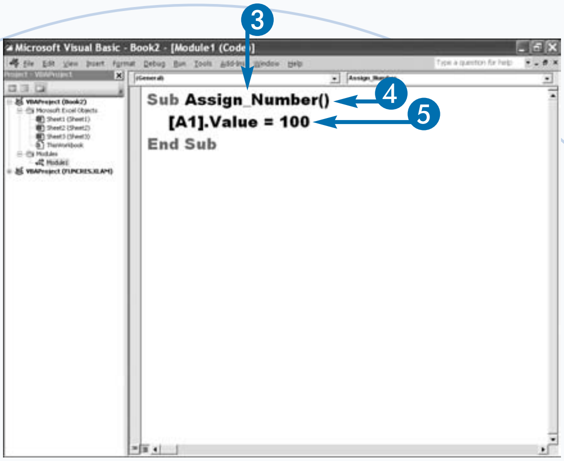
④ Type parentheses.

Place arguments between the parentheses separated by commas.

⑤ Type your code.

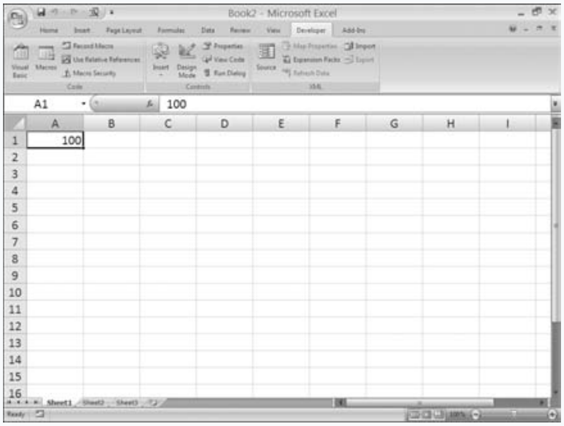
⑥ Press Alt+F11 to switch from the VBE to Excel, and then run your macro.

Note: *See Chapter 1 to learn how to run a macro.*



```
Sub Assign_Number()
    [A1].Value = 100
End Sub
```

In this example, VBA places the number 100 in cell A1.



Extra

Glossary

TERM	DEFINITION
Argument	An argument passes information from one procedure to another. An argument can be a constant, a variable, or an expression.
Constant	A value that remains the same.
Function	A type of procedure. This is a block of code that performs a task (usually a calculation) and returns a value.
Expression	A combination of objects, numbers, text, operators, and variables that yield a result. A mathematical equation is an example of an expression.
Procedure	A sequence of code that, when executed, performs a task in Excel. There are several types of procedures.
Sub procedure	A procedure that performs a task but does not return a value.
Variable	A named location where you store information. In the expression x=1, x is a variable that has been assigned the value 1.

Create Functions

You are probably already familiar with functions. Excel has over 300 predefined functions, with SUM being the most commonly used. You use the SUM function to add a list of values. Like a Sub procedure, a function is a special type of procedure. A *function* is a block of code that performs a task — usually a calculation — and returns a value. There are three types of functions: VBA functions, worksheet functions, and custom functions.

VBA functions are provided for your use by VBA. You can use these functions in your code. The MsgBox function is a popular VBA function explained in detail, along with several other VBA functions, in Chapter 7. When executed, the MsgBox function displays a pop-up box with your message. Other VBA functions obtain input from users, execute another program, return the current date, or return the current time.

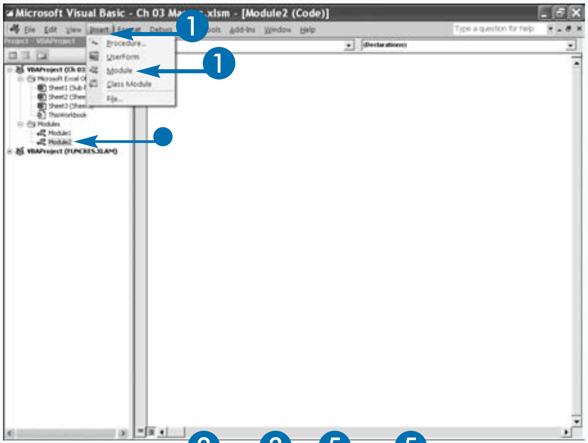
If an analogous VBA function is not available, you can use Excel's worksheet functions in your code. Chapter 7 explains how to use worksheet functions in detail.

If none of the VBA or worksheet functions suits your needs, you can create a custom function. Every custom function begins with the key word `Function` followed by the name of the function and parentheses. If your function takes arguments, you place the arguments between the parentheses, separated by commas. Every Custom Function ends with the key words `End Function`. There are only two ways to execute a custom function: by using the function in a formula or by calling the function from a procedure. Excel lists custom functions under User Defined in the Insert function dialog box. See Chapter 7 for more information on custom functions.

Understanding Functions

① Click Insert ➔ Module.

- The VBE creates a new module.


Microsoft Visual Basic - Ch 03 Ma .xlsm - [Module2 (Code)]
File Edit View Insert Format Debug Tools Add-Ins Window Help
Procedure...
UserForm
Module
Class Module
File...
(Declarations)
Module1
Module2
1
1

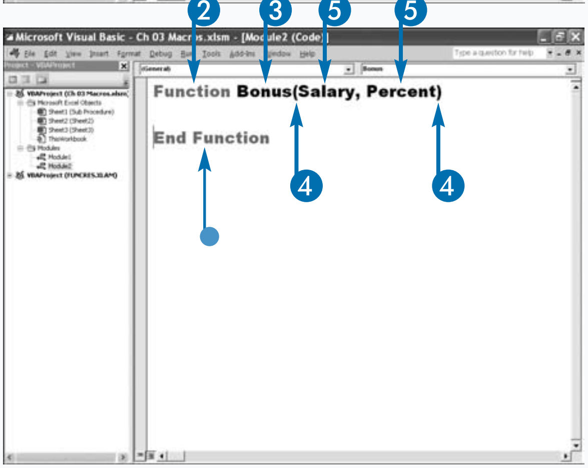
② Type **Function**.

- The VBE automatically adds the words End Function.

③ Type your procedure name.

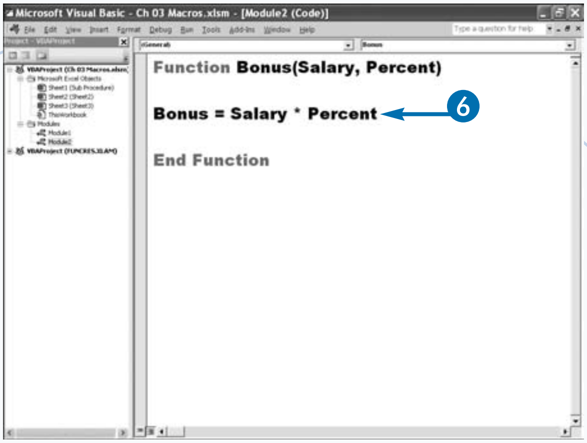
④ Type parentheses.

⑤ Type arguments between the parentheses, separated by commas.


Microsoft Visual Basic - Ch 03 Macros.xlsm - [Module2 (Code)]
(General)
Bonus
2
3
5
5
4
4

```
Function Bonus(Salary, Percent)

End Function
```

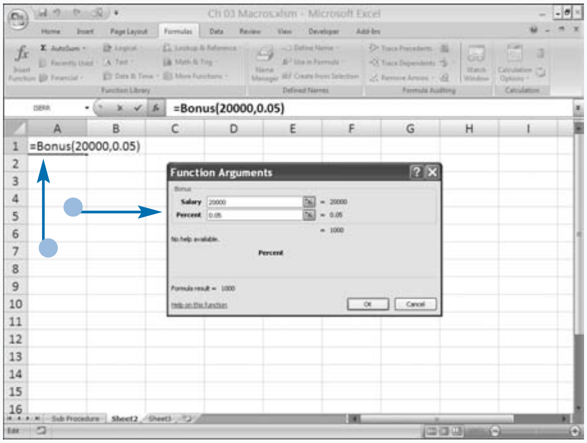
6. Type your code.
7. Press Alt+F11 to switch from the VBE to Excel.



Microsoft Visual Basic - Ch 03 Macros.xlsm - [Module2 (Code)]
(General)
Bonus
6

```
Function Bonus(Salary, Percent)

Bonus = Salary * Percent

End Function
```

- You can use your function to perform calculations.



Ch 03 Macros.xlsm - Microsoft Excel
Function Arguments
Bonus
OK
Cancel
Help on this function
Sub Procedure
Sheet2
Sheet3

=Bonus(20000,0.05)

Salary 20000 = 20000

Percent 0.05 = 0.05

= 1000

No help available.

Percent

Formula result = 1000

Extra

You can create VBA functions you can use within Excel to perform calculations. When you create a public function in the VBE, the function is listed in the Insert Function dialog box that appears when you click Formulas ➔ Insert Function within Excel. The VBE places the functions you create under the User Defined category in the Insert Function dialog box. You can use these VBA functions in your worksheet to create formulas in the same way that you use the built-in functions that are standard with Excel. The VBA functions you create are available in the Insert Function dialog box only when the workbook containing the functions is open. Therefore, if you create a specific function you want to use in all your workbooks, you should add the function to your Personal Macro Workbook, Personal.xlsm, to ensure that it is always available from within Excel. The Personal Macro Workbook always opens with Excel, so any macros and functions it contains are always available. See Chapter 1 for more information on the Personal Macro Workbook.

Comment Your Code

With comments, you can document each step of your code. You can use comments to document such things as the person who created the code, the date when you last updated the code, the purpose of the code, and the purpose of each step of the code. When you are working in a collaborative environment, comments are essential.

In VBA you start a comment by typing an apostrophe ('). When you execute the code, VBA ignores everything after the apostrophe. Comments and code appear in different colors. After you add an apostrophe, the VBE changes the color of the commented text.

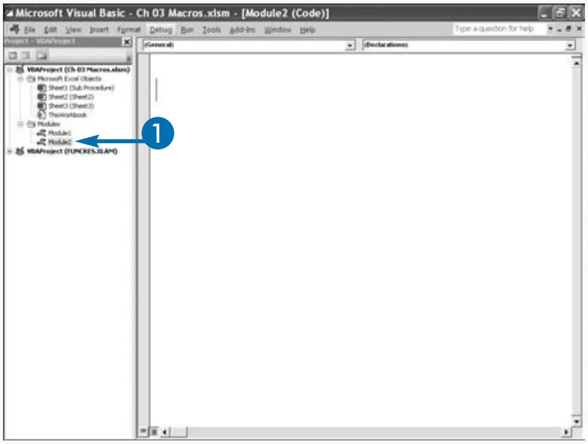
You can place an apostrophe anywhere in a line of code, and VBA views the text after the apostrophe as a comment. There is one exception to this rule: If you type an apostrophe within double quotation marks, VBA does not view it as a comment. For example, VBA would not view the text after the apostrophe in the following example as code: `Saying = "That's Life!"`

Comments only help if they provide enough information to describe the code. A reader should be able to read the comments without studying the code and get a good sense of what the code does. For example, a comment such as "Sums the values" does not provide enough information about the code. Saying "Sums the values in cells A1 and A2 and places the result in cell A3" is better because it describes the actual process.

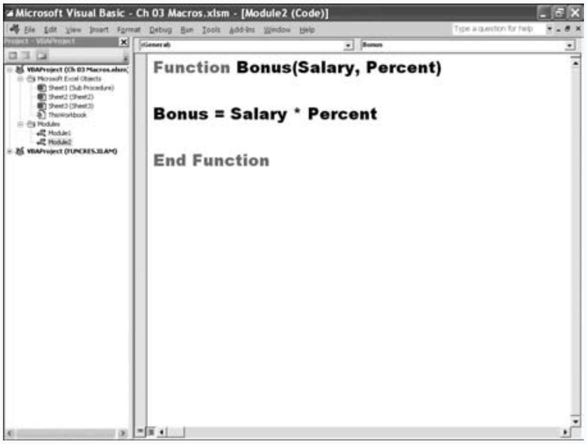
You can turn several lines of code into a comment by using the Comment Block option on the Edit toolbar. Later, if you want to make the commented lines code again, you can click the Uncomment button.

Comment Your Code

① Double-click the module that contains the code you want to document.


Microsoft Visual Basic - Ch 03 Macros.xlsm - [Module2 (Code)]
Project - VBAProject
VBAProject (Ch 03 Macros.xlsm)
Microsoft Excel Objects
Sheet1 (Sub Procedure)
Sheet2 (Sheet2)
Sheet3 (Sheet3)
ThisWorkbook
Modules
Module1
Module2
VBAProject (FUNCRES.XLAM)
(General)
(Declarations)
1

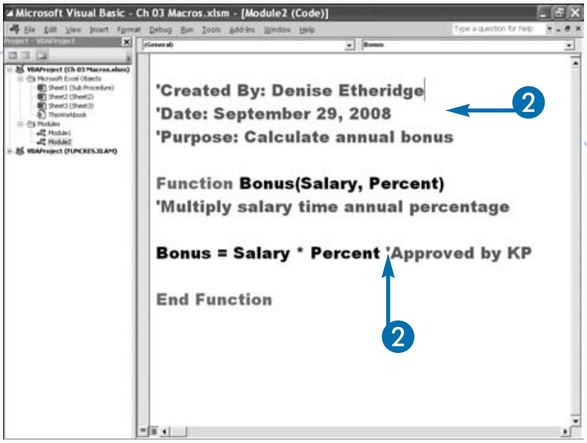
Your code appears in the Code window.


Microsoft Visual Basic - Ch 03 Macros.xlsm - [Module2 (Code)]
(General)
Bonus

```
Function Bonus(Salary, Percent)

Bonus = Salary * Percent

End Function
```

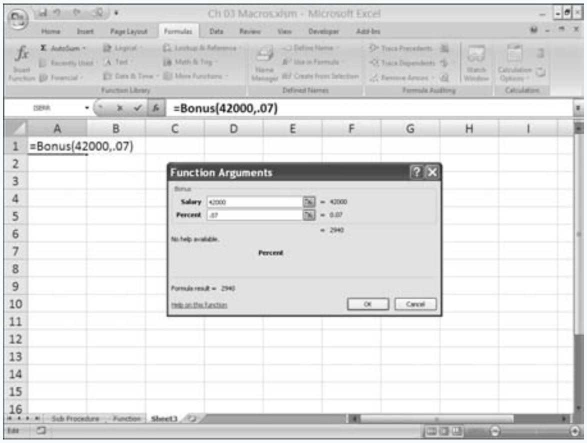
② Type an apostrophe followed by your comments.

You can place your comments anywhere.


Microsoft Visual Basic - Ch 03 Macros.xlsm - [Module2 (Code)]
(General)
Bonus
②
②

```
'Created By: Denise Etheridge
'Date: September 29, 2008
'Purpose: Calculate annual bonus

Function Bonus(Salary, Percent)
'Multiply salary time annual percentage

Bonus = Salary * Percent 'Approved by KP

End Function
```

③ Press Alt+F11 to switch from the VBE to Excel, and then run the code.


Ch 03 Macros.xlsm - Microsoft Excel
Function Arguments
Bonus
OK
Cancel
Help on this function

=Bonus(42000,.07)

Salary 42000 = 42000

Percent .07 = 0.07

= 2940

No help available.

Percent

Formula result = 2940

The comments do not affect your code.

Extra

You can use comments when you are testing your code. If you suspect a line of code is causing your code to run improperly, you can comment it out and run your procedure without it. The process eliminates the need to delete the line of code. You can reactivate the commented-out code by simply removing the apostrophe.

In the VBE, you can use the Edit toolbar to comment out a block of code. To access the Edit toolbar, click View ➔ Toolbars ➔ Edit. The Edit toolbar appears. Select the lines of code you want to comment out. Click the Comment Block button (☰). The VBE comments out your code. When you run your procedure, the lines of code do not execute. To uncomment the lines of code, select them and then press the Uncomment Block (☰) button.

Understanding Variables and Data Types

You use variables to store information for later use. The following syntax stores information to a variable.

```
VaribleName = Value
```

VariableName represents the name you give to the variable. The equal sign is the assignment operator. The assignment operator tells VBA you want to assign something to a variable. Value represents what you want to assign to the variable. Once you assign a value to a variable, VBA retrieves the assigned value whenever you use the variable name. For example, you might make the following assignment:

```
x=2
```

With this assignment, every time VBA sees the variable x, it interprets it to mean 2. You can change the value assigned to a variable many times and at any point in your code.

Variable Names

You can name your variables anything you like; however, you must follow these rules:

- The first character of the variable name must be a letter.
- Your variable name cannot include a space or any of the following: . ! @ & $ or #.
- Your variable name cannot exceed 255 characters.
- Generally, you should not use names that are the same as functions, statements, or methods.
- Your variable name must be unique within its scope.
- You do not need to start each word in your variable name with an uppercase letter; however, that is the convention used in this book. If you develop a convention and use it consistently, you will have an easier time debugging your code.

Data Types

In VBA, a variable can store many data types, including strings, dates, Booleans, and a variety of number types. A *string* is any sequence of characters consisting of any combination of letters, numbers, or punctuation marks. A *Boolean* is a value that is either true or false. A *number* is a value on which you can perform mathematical operations such as addition, subtraction, multiplication, and division.

If you do not declare a data type, VBA assigns the default data type of variant. When a variable is a variant data type, VBA examines the variable to determine if the value is an integer, string, date, Boolean, or other data type. When you change the value assigned to the variable, VBA automatically changes the data type if needed. For example, if you assign `x = true`, VBA evaluates the expression and determines that `x` is a Boolean. If you later change the assignment to `x = "George"`, VBA reevaluates the expression and determines `x` is a string. Having VBA evaluate your variables slows down your code.

When you declare a variable in VBA, you explicitly tell VBA the variable's data type. In other words, if your variable contains an integer, you declare an integer variable. Because declaring a variable makes your code run faster and more efficiently, you should make a habit of declaring variables. To ensure that variables are always properly declared, type Option Explicit as the first statement in your module. If Option Explicit is the first statement in your module, your code will not run if you have any undeclared variables. You must place the Option Explicit statement at the top of each module you create.

Scope of Variables

Each Excel workbook is a project. Each Sub procedure and function you create is a procedure. You can place multiple procedures in a single module, and you can have many modules in a project. VBA variables can be procedure only, module only, or public. Only the procedure in which the variable resides can use a procedure-only variable. Any procedure in a module can use a module-only variable. Any procedure in a project can use a public variable.

Use the Dim statement to declare a procedure-only variable. You place the statement after the Sub statement but before the procedure code and End Sub statement in a Sub procedure. In a custom function, you place the Dim statement after the Function statement but before the procedure code and the End Function statement. The following example includes several Dim statements to declare procedure-only variables:

Example:

```
Option Explicit
Sub ProcedureOnlyExample()
    Dim EmpLastName As String
    Dim Salary As Long
    Dim StartDate As Date
' Place procedure code here
End Sub
```

When you want to create a module-only variable that any procedure in a module can use, you place your declarations before the first Sub or Function statement in the module. You refer to this area of the module as the declarations area. The example shown here includes several Dim statements used to declare module-only variables.

Example:

```
Option Explicit
    Dim EmpLastName As String
    Dim Salary As Long
    Dim StartDate As Date
Sub ModuleOnlyExample()
' Place module only declarations here.
' Place procedure code here
End Sub
```

When you want to create a public variable that any procedure in your project can use, you place your declarations in the declarations area before the first Sub or Function statement in the module and precede it with the keyword Public instead of Dim.

Example:

```
Option Explicit
    Public EmpLastName As String
    Public Salary As Long
    Public StartDate As Date
' Place module only declarations here
Sub PublicVariableExample()
' Place module only declarations here.
' Place procedure code here
End Sub
```

Reference Cells and Ranges

As you write your VBA code, you will frequently need to reference cells in an Excel worksheet either to access the information in cells or to put information there. VBA has several methods you can use to reference cells.

One method is the Cells method. When using the Cells method, you use an index to reference a row and column. For example, if you want to reference cell A1, you type the word Cells followed by an open parenthesis, the row reference, a comma, the column reference in quotes, a close parenthesis, a period, and the word Value. The period and the word Value are optional. Both of the following assign the value 1 to cell A1: `Cells(1,"A").Value = 1`, `Cells(1,"A") = 1`

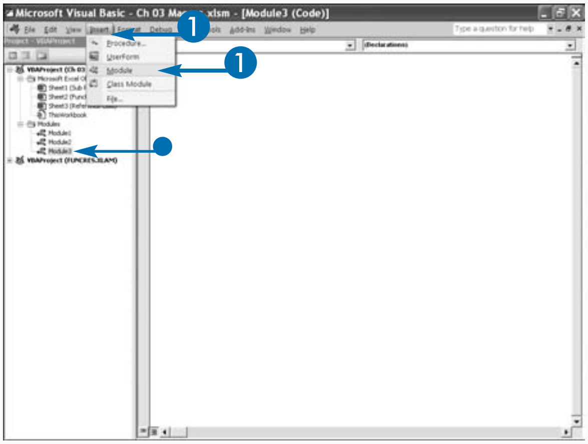
When using the Cells method, you can also use numbers to identify the column. The first column in your worksheet is column 1, and each column thereafter is numbered sequentially. To assign the value 10 to cell E1, you would type either of the following: `Cells(1,5).Value = 10`, `Cells(1,5) = 10`. Column E is identified by a 5 because it is the fifth column in a worksheet. Using numbers to identify a column is preferable because you can use loops to manipulate your row and column references. To learn more about loops, see Chapter 6.

If you have a simple procedure and you would like to access a cell, you can enclose the cell reference in square brackets followed by a period and the word Value. For example, you can use the following to place the number 25 in cell B3: `[B3].Value = 25`.

Reference Cells and Ranges

① Click Insert ➔ Module.

- The VBE creates a new module.

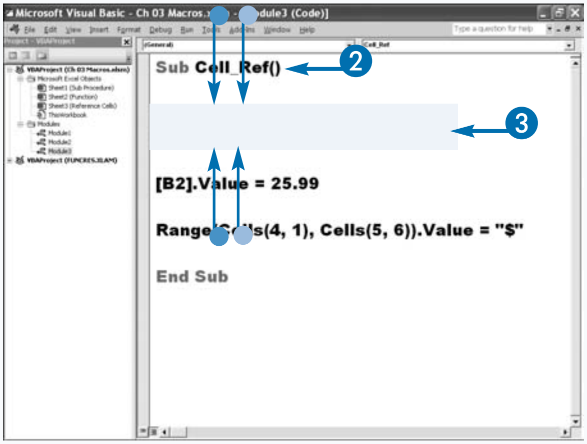

Microsoft Visual Basic - Ch 03 Ma...xlsm - [Module3 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Procedure...
UserForm
Module
Class Module
File...
(Declarations)
Modules
Module1
Module2
Module3
1
1

② Name your procedure.

Note: *See the section, "Understanding Sub Procedures," to learn how to name a procedure.*

③ Reference a cell by using the Cells method.

- This is a Row reference.
- This is a Column reference.


Microsoft Visual Basic - Ch 03 Macros.x... - [Module3 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
Cell_Ref
VBAProject (Ch 03 Macros.xlsm)
Microsoft Excel Objects
Sheet1 (Sub Procedure)
Sheet2 (Function)
Sheet3 (Reference Cells)
ThisWorkbook
Modules
Module1
Module2
Module3
VBAProject (FUNCRES.XLAM)
2
3

```
Sub Cell_Ref()


[B2].Value = 25.99

Range(Cells(4, 1), Cells(5, 6)).Value = "$"

End Sub
```

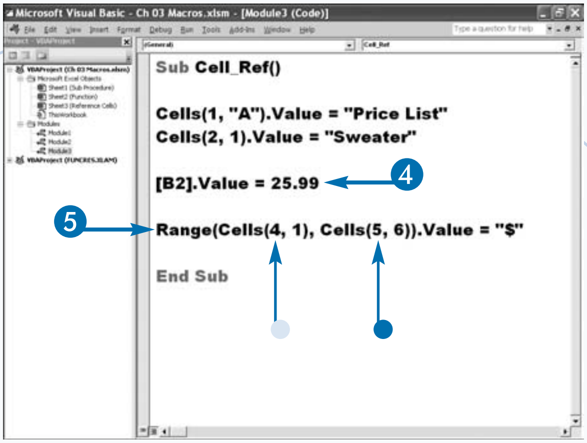
④ Reference a cell by using the cell address.

⑤ Fill a range of cells with a value.

- ○ This is the starting cell.
- ● This is the ending cell.

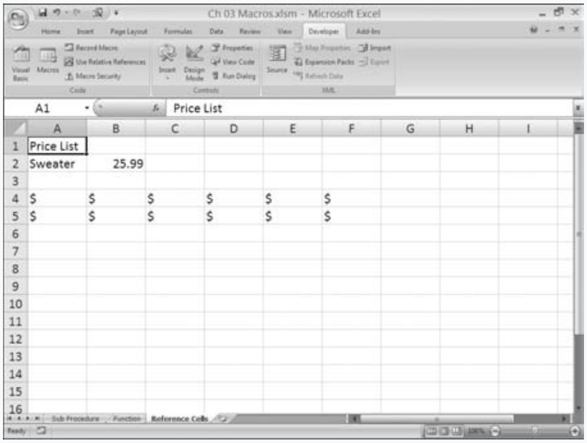
⑥ Press Alt+F11 to switch from the VBE to Excel, and then run the macro.

Note: *See Chapter 1 to learn how to run a macro.*


Microsoft Visual Basic - Ch 03 Macros.xlsm - [Module3 (Code)]
(General)
Cell_Ref
VBAProject (Ch 03 Macros.xlsm)
Microsoft Excel Objects
Sheet1 (Sub Procedure)
Sheet2 (Function)
Sheet3 (Reference Cells)
ThisWorkbook
Modules
Module1
Module2
Module3
VBAProject (FUNCRES.XLAM)
4
5

```
Sub Cell_Ref()

Cells(1, "A").Value = "Price List"
Cells(2, 1).Value = "Sweater"

[B2].Value = 25.99

Range(Cells(4, 1), Cells(5, 6)).Value = "$"

End Sub
```

The VBA places the values in the cells you specified.


Ch 03 Macros.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Visual Basic
Macros
Record Macro
Use Relative References
Macro Security
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
XML
A1
Sub Procedure
Function
Reference Cells
Ready

A1: Price List

	A	B	C	D	E	F
1	Price List					
2	Sweater	25.99				
3						
4	$	$	$	$	$	$
5	$	$	$	$	$	$

Extra

You can also use the Range property to reference cells. The following table illustrates Range syntax:

SYNTAX	REFERENCE
Range("C4")	Cell C4
Range("B1:B7")	Cells B1 to B7
Range("D1:D8, F1:H2, F7:H8, G2:G6")	Cells D1 to D8, F1 to H2, F7 to H8, and G2 to G6
Range("J:J")	Column J
Range("11:11")	Row 11
Range("L:M")	Columns L to M
Range("14:16")	Rows 14 to 16

Declare Variables

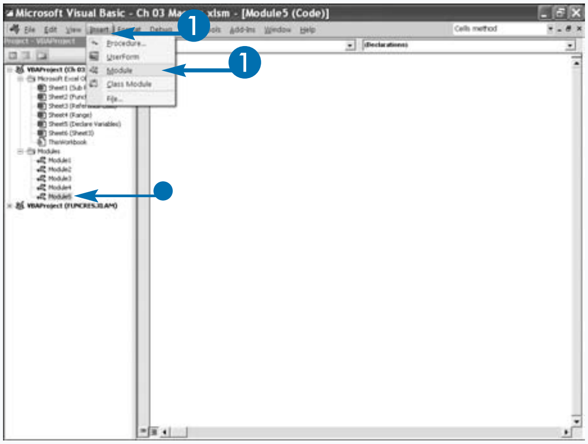
You use a variable to store information for later use. If you are making an assignment to a variable, you should start by declaring the variable. In its simplest form, declaring your variable consists of telling VBA what data type your variable will use.

You can assign one of several data types. Most are listed in the "Extra" section of this task. Generally, if your data consists of text or numbers you do not intend to use in a mathematical calculation, you should declare your data as a string. If your data is numerical data you do intend to use in mathematical calculations, you should use one of the many numeric data types. Use the data type that uses the least amount of bytes but fully accommodates your needs. If you do not declare your variables, VBA assigns a variable type of variant. A variant data type can hold any type of data. However, declaring your variables makes your code run faster. You should declare your variables.

You can declare a variable as procedure only, module only, or public. To learn more, see the section, "Understanding Variables and Data Types." You use a Dim statement to declare a procedure-only or module-only variable. You type the word Dim followed by the variable name, the As keyword, and then the variable type — for example, `Dim EmployeeName As String`. If you are declaring a public variable, you replace the Dim keyword with Public: `Public EmployeeName As String`.

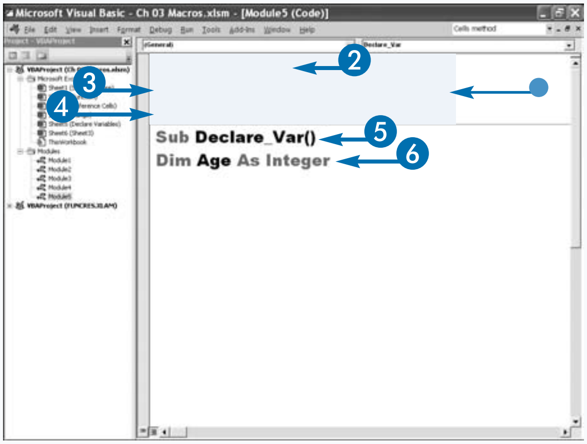
After you have declared a variable, you assign a value to it. Type the variable name, followed by an equal sign and the value you want to assign the variable — for example, `EmployeeName = "John Smith"`.

Declare Variables



① Click Insert ➔ Module.

- The VBE creates a new module.


Microsoft Visual Basic - Ch 03 Macros.xlsm - [Module5 (Code)]
(General)
Declare_Var
2
3
4
5
6

```
Sub Declare_Var()
Dim Age As Integer
```

② Type **Option Explicit**.

Note: *See the section, "Understanding Variables and Data Types," for more information.*

- This is the declarations area.

③ Declare your public variables.

④ Declare your module-only variables.

⑤ Name your procedure.

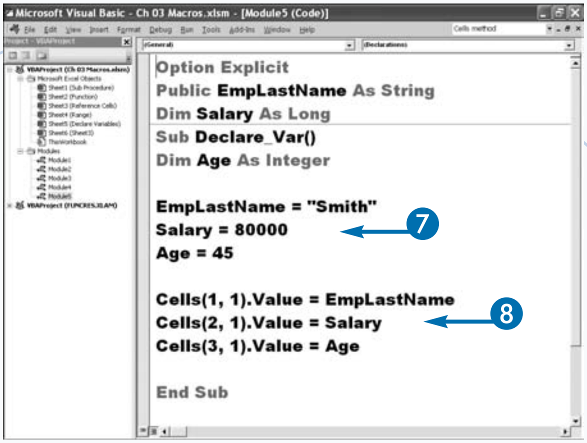
⑥ Declare your procedure-only variables.

7. Assign values to your variables.

Note: *See the sections, "Work with Numbers" and "Work with Strings," to learn more.*

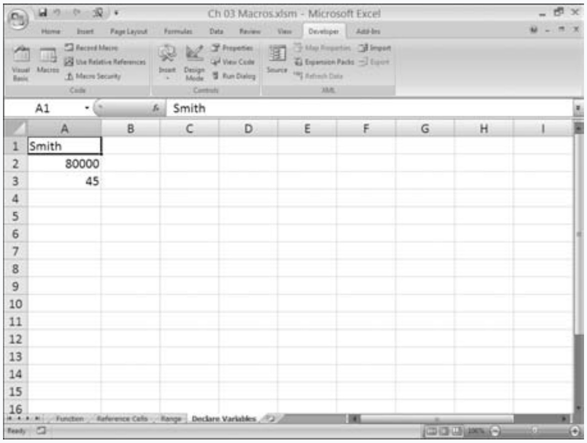
8. Place the values in cells.

9. Press Alt+F11 to switch from the VBE to Excel, and then run the macro.


Microsoft Visual Basic - Ch 03 Macros.xlsm - [Module5 (Code)]
(General)
(Declarations)
7
8

```
Option Explicit
Public EmpLastName As String
Dim Salary As Long
Sub Declare_Var()
Dim Age As Integer

EmpLastName = "Smith"
Salary = 80000
Age = 45

Cells(1, 1).Value = EmpLastName
Cells(2, 1).Value = Salary
Cells(3, 1).Value = Age

End Sub
```

VBA places the values in your variables in the cells you specified.



Extra

You should choose the data type that uses the smallest number of bytes but can accommodate your data. Excel provides characters you can use to set the data type for a variable. For example, you can use the following syntax to declare a string: `Dim EmployeeName$`.

DATA TYPE	BYTES USED	RANGE OF VALUE	DECLARATION CHARACTER
Boolean	2 bytes	`True` or `False`	
Date	8 bytes	1/1/100 to 12/31/9999	
Double (negative values)	8 bytes	–1.79769313486231E308 to –4.94065645841247E–324	#
Double (positive values)	8 bytes	4.94065645841247E–324 to 1.79769313486232E308	#
Integer	2 bytes	–32,768 to 32,767	%
Long	4 bytes	–2,147,483,648 to 2,147,483,647	&
Object	4 bytes	Any defined object	
Single (negative values)	4 bytes	–3.402823E38 to –1.401298E-45	!
Single (positive values)	4 bytes	1.401298E–45 to 3.402823E38	!
String	1 per character	Varies	$
Variant	Varies	Varies	

Work with Numbers

To perform mathematical calculations, you use VBA's seven arithmetic operators: the plus (+), minus (–), multiplication (*), division (/), exponential (^), integer division (\), and Mod operators. You use the plus operator to add, the minus operator to subtract or negate, the multiplication operator to multiply, the division operator to divide, and the exponential operator to raise to a power.

The integer division operator divides two values and returns only the integer portion of the result. VBA discards the remainder when you use this operator. For example, the expression `X = 10\3` returns 3. The Mod operator divides two numbers and returns only the remainder. For example, the expression `X = 10 Mod 3` returns 1. This operator works well for predetermining if two values divide evenly. If the Mod returns a zero, the values divide evenly.

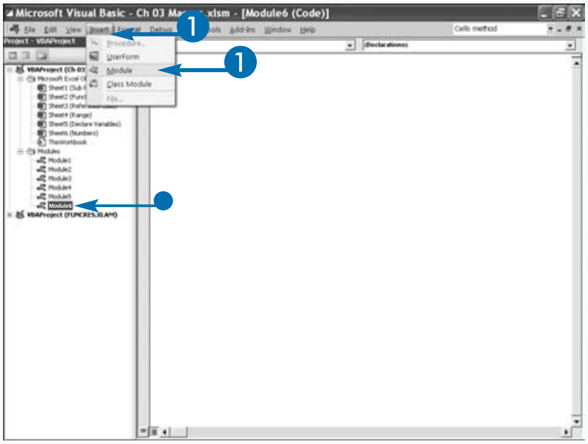
You can assign the results of a mathematical calculation to a variable, and you can include cells and variables in your calculations. All of the following are valid: `A = 5`, `X = A + 25`, `X = 5 + 7`, `X = 9 + Cells(1,1).Value`.

When you perform a mathematical calculation in VBA, you must be careful of precedence — the order in which VBA performs calculations. VBA performs calculations from left to right, performing multiplication and division before addition and subtraction. For example, the formula `= 3 + 4 * 2` returns 11, VBA multiplies 4 times 2 and then adds 3. If you want to change the order of precedence, use parentheses. Excel calculates numbers in parentheses first. The formula `= (3 + 4) * 2` returns 14, VBA adds 3 plus 4 and then multiplies the result by 2.

Work with Numbers

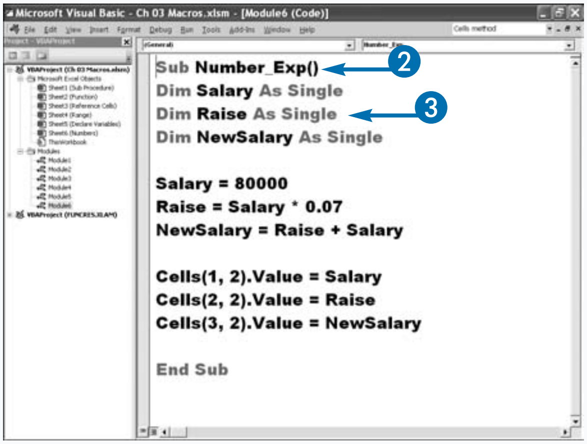
① Click Insert ➔ Module.

- The VBE creates a new module.


Microsoft Visual Basic - Ch 03 Ma…xlsm - [Module6 (Code)]
File
Edit
View
Insert
Format
Debug
…ools
Add-Ins
Window
Help
Cells method
Project - VBAProject
Procedure...
UserForm
Module
Class Module
File...
(Declarations)
VBAProject (Ch 03
Microsoft Excel O
Sheet1 (Sub
Sheet2 (Funct
Sheet3 (Refer
Sheet4 (Range)
Sheet5 (Declare Variables)
Sheet6 (Numbers)
ThisWorkbook
Modules
Module1
Module2
Module3
Module4
Module5
Module6
VBAProject (FUNCRES.XLAM)
1
1

② Name your procedure.

③ Declare your variables.


Microsoft Visual Basic - Ch 03 Macros.xlsm - [Module6 (Code)]
File
Edit
View
Insert
Format
Debug
Run
Tools
Add-Ins
Window
Help
Cells method
Project - VBAProject
(General)
Number_Exp
VBAProject (Ch 03 Macros.xlsm)
Microsoft Excel Objects
Sheet1 (Sub Procedure)
Sheet2 (Function)
Sheet3 (Reference Cells)
Sheet4 (Range)
Sheet5 (Declare Variables)
Sheet6 (Numbers)
ThisWorkbook
Modules
Module1
Module2
Module3
Module4
Module5
Module6
VBAProject (FUNCRES.XLAM)
2
3

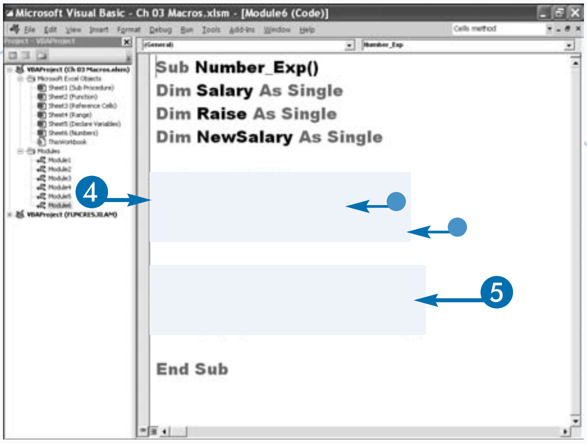
```
Sub Number_Exp()
Dim Salary As Single
Dim Raise As Single
Dim NewSalary As Single

Salary = 80000
Raise = Salary * 0.07
NewSalary = Raise + Salary

Cells(1, 2).Value = Salary
Cells(2, 2).Value = Raise
Cells(3, 2).Value = NewSalary

End Sub
```

④ Assign numeric values to variables.

- You can perform mathematical calculations.

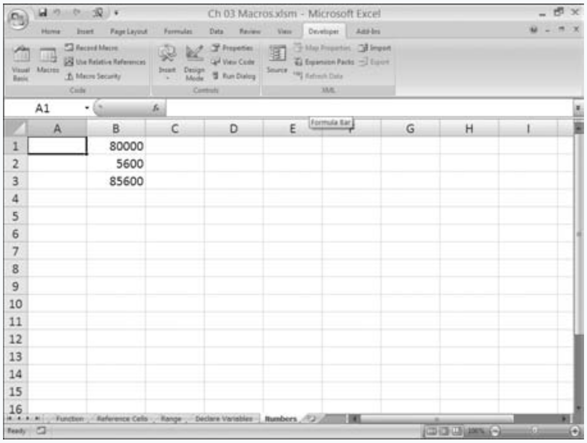
⑤ Assign variables to cells.

⑥ Press Alt+F11 to switch from the VBE to Excel, and then run the macro.


Microsoft Visual Basic - Ch 03 Macros.xlsm - [Module6 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Cells method
Project - VBAProject
VBAProject (Ch 03 Macros.xlsm)
Microsoft Excel Objects
Sheet1 (Sub Procedure)
Sheet2 (Function)
Sheet3 (Reference Cells)
Sheet4 (Range)
Sheet5 (Declare Variables)
Sheet6 (Numbers)
ThisWorkbook
Modules
Module1
Module2
Module3
Module4
Module5
Module6
VBAProject (FUNCRES.XLAM)
(General)
Number_Exp
4
5

```
Sub Number_Exp()
Dim Salary As Single
Dim Raise As Single
Dim NewSalary As Single




End Sub
```

VBA places the values in your variables in the cells you specified.


Ch 03 Macros.xlsm - Microsoft Excel
Home Insert Page Layout Formulas Data Review View Developer Add-Ins
Visual Basic
Macros
Record Macro
Use Relative References
Macro Security
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
A1
Formula Bar
Function
Reference Cells
Range
Declare Variables
Numbers
Ready
100%

	A	B
1		80000
2		5600
3		85600

Extra

The following table shows the precedence order, from highest to lowest, that VBA uses to evaluate operators in formulas. If the operators in the formula have the same order of precedence, Excel evaluates the equation from left to right.

PRECEDENCE	OPERATORS	SYMBOL
1	Exponentiation	^
2	Minus sign	– (negates a number before any calculations)
3	Multiplication and division	* /
4	Integer division	\
5	Modulus arithmetic	Mod
6	Addition and subtraction	+ –

Work with Strings

You can assign strings to a variable so you can use the string elsewhere in your code. A string is any sequence of characters consisting of any combination of letters, numbers, and punctuation marks. A string can have up to two billion characters. When you declare a string variable, you type the **Dim** keyword followed by the variable name and **As String** — for example, `Dim SampleString As String`.

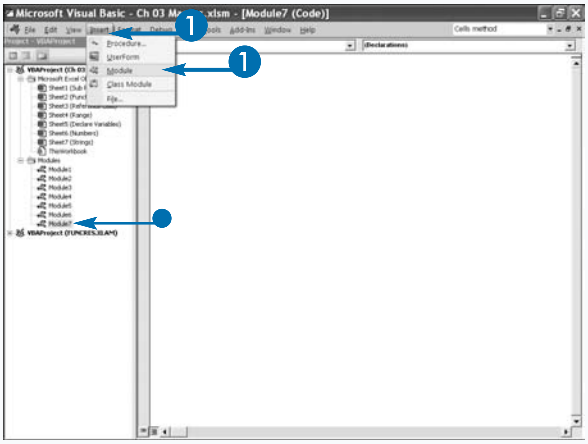
You can assign a string data type to a variable by typing the variable name followed by an equal sign and then the value you want to assign to the variable within quotation marks. For example, you could use the following syntax to assign the name John Smith to the string variable EmployeeName: `EmployeeName = "John Smith"`.

You can join the contents of two or more strings to create one string. The process of joining strings is called *concatenation.* Use the concatenation operator (&) or the plus concatenation operator (+) to combine strings. Using the concatenation operator is the better choice because the plus concatenation operator can be confused with the plus arithmetic operator. The expression `FirstName = "David"` assigns the string `David` to the variable `FirstName`. The expression `LastName = "Jackson"` assigns the string `Jackson` to the variable `LastName`. The expression `FullName = FirstName + " " + LastName` and the expression `FullName = FirstName & " " & LastName` both return David Jackson. You include the double quotation marks separated by a space (" ") to leave a space between the first and last names.

Work with Strings

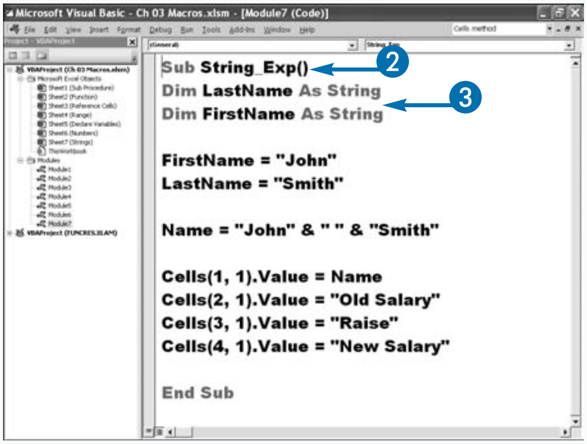
① Click Insert ➔ Module.

- The VBE creates a new module.


Microsoft Visual Basic - Ch 03 Macros.xlsm - [Module7 (Code)]
1
Procedure...
UserForm
Module
Class Module
File...
1
Module7

② Name your procedure.

③ Declare your variables.

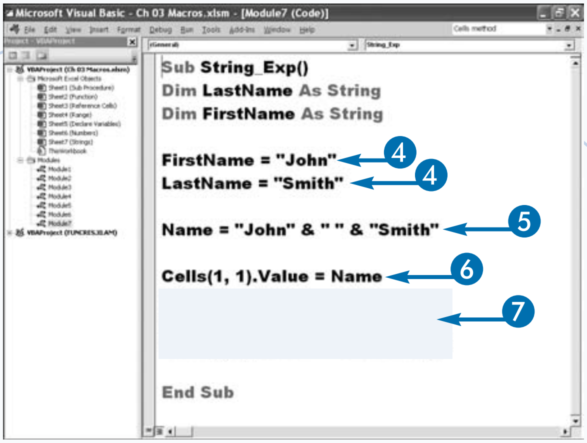

Microsoft Visual Basic - Ch 03 Macros.xlsm - [Module7 (Code)]
2
3

```
Sub String_Exp()
Dim LastName As String
Dim FirstName As String

FirstName = "John"
LastName = "Smith"

Name = "John" & " " & "Smith"

Cells(1, 1).Value = Name
Cells(2, 1).Value = "Old Salary"
Cells(3, 1).Value = "Raise"
Cells(4, 1).Value = "New Salary"

End Sub
```

4. Assign string values to variables.
5. Concatenate the strings.
6. Assign a variable to a cell.
7. Assign strings to cells.

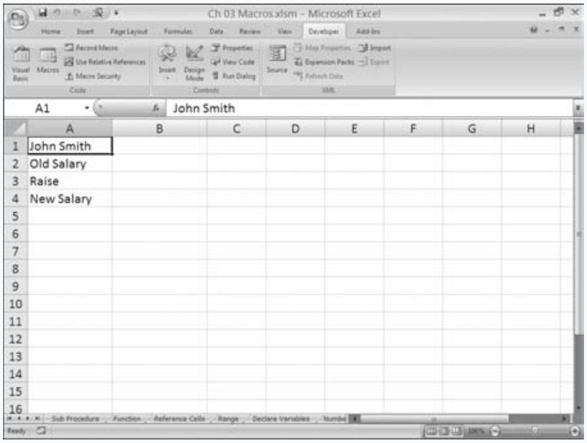
   You can assign any data type to a cell.

8. Press Alt+F11 to switch from the VBE to Excel, and then run the macro.


Microsoft Visual Basic - Ch 03 Macros.xlsm - [Module7 (Code)]
(General)
String_Exp
4
4
5
6
7

```
Sub String_Exp()
Dim LastName As String
Dim FirstName As String

FirstName = "John"
LastName = "Smith"

Name = "John" & " " & "Smith"

Cells(1, 1).Value = Name

End Sub
```

VBA places the values in your variables in the cells you specified.


Ch 03 Macros.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
A1
John Smith

	A
1	John Smith
2	Old Salary
3	Raise
4	New Salary

Extra

When you declare a string, you can declare it as a fixed-length or a variable-length string. A fixed-length string can have between 1 and 65,526 characters. When declaring a fixed-length string, you specify the string's maximum length in characters. For example, you can use the following syntax to declare a fixed-length string with a maximum of ten characters: `Dim SampleString As String * 10`.

When concatenating fixed-length strings, there is the potential for exceeding the declared or maximum length of the string. VBA does not extend the size of a fixed-length string to store a larger string. If two joined strings form a string larger than the space allows, VBA truncates the string to fit the allotted space. If each of the strings you want to join is ten characters in length, you must make the variable that receives the concatenated string at least 20 characters in length, or VBA will truncate the string.

Create a Constant

If you often use a value that never changes, you can declare it is as a constant. For example, there are four quarters in a year. If, in your code, you frequently divide an annual amount by four to get the average quarterly amount, you can store 4 to a constant named NumOfQuarters and use the constant when performing calculations. When you review your code and see the constant name, you instantly know you are dividing by the number of quarters, whereas if you use the number 4, the true meaning of the number would not be as readily apparent. In short, using constants makes your code easier to understand.

You declare constants with a specific data type. In fact, constants use the same data types that variables use. As with variables, if you do not specify a data type for a constant, VBA treats the value as a variant. After you assign a constant a value, you cannot alter the value.

If you want your constant to be available only to the procedure in which it was created, declare your constant after the Sub or Function statement. If you want your constant to be available to all of the procedures in your module, declare your constant in the declarations area. If you want your constant to be available to any procedure in the workbook, declare your constant in the declarations area and use the Public keyword.

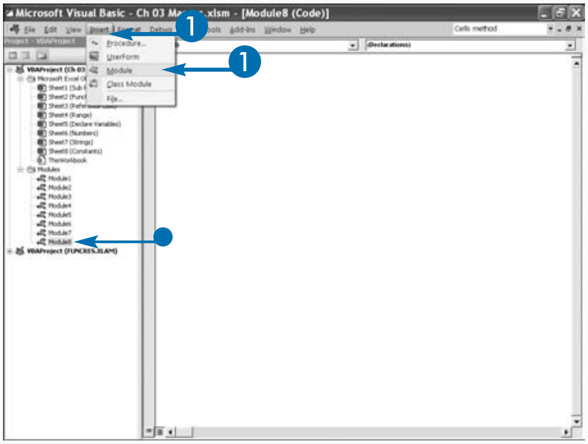
Declaration examples: `Const NumOfQuarters As Integer = 4, Public Const Region As String = "New York"`

To name your constant, you use the same naming rules as for variables. For more information, see the section, “Understanding Variables and Data Types,” earlier in this chapter.

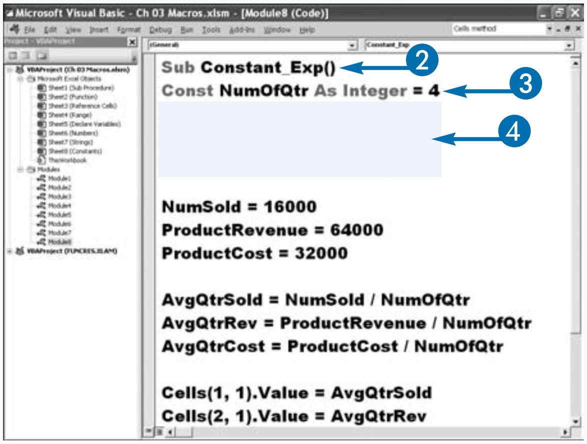
Create a Constant

1. Click Insert ➔ Module.

- The VBE creates a new module.


Microsoft Visual Basic - Ch 03 Macros.xlsm - [Module8 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Procedure...
UserForm
Module
Class Module
File...
(Declarations)
1
1

2. Name your procedure.
3. Create your constant.
4. Declare your variables.


Microsoft Visual Basic - Ch 03 Macros.xlsm - [Module8 (Code)]
(General)
Constant_Exp
2
3
4

```
Sub Constant_Exp()
Const NumOfQtr As Integer = 4



NumSold = 16000
ProductRevenue = 64000
ProductCost = 32000

AvgQtrSold = NumSold / NumOfQtr
AvgQtrRev = ProductRevenue / NumOfQtr
AvgQtrCost = ProductCost / NumOfQtr

Cells(1, 1).Value = AvgQtrSold
Cells(2, 1).Value = AvgQtrRev
```

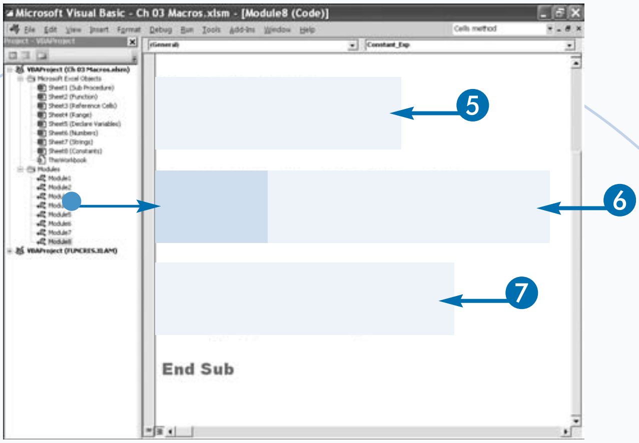
⑤ Assign values to variables.

⑥ Use your constant in calculations.

- The results are stored in a variable.

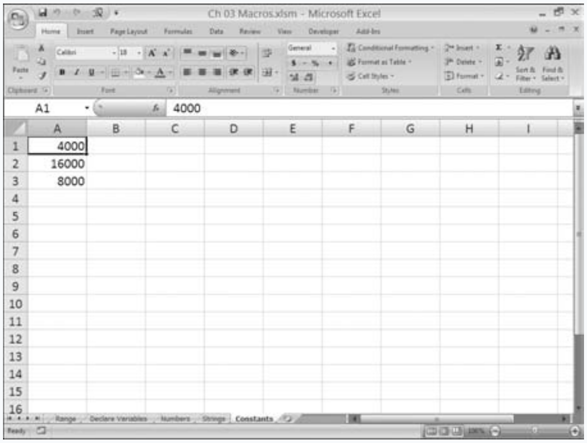
⑦ Assign variables to cells.

⑧ Press Alt+F11 to switch from the VBE to Excel, and then run the macro.


Microsoft Visual Basic - Ch 03 Macros.xlsm - [Module8 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Project - VBAProject
(General)
Constant_Exp
5
6
7

```
End Sub
```

VBA places the values in your variables in the cells you specified.


Ch 03 Macros.xlsm - Microsoft Excel
Home Insert Page Layout Formulas Data Review View Developer Add-Ins
A1
4000
Range Declare Variables Numbers Strings Constants
Ready

	A
1	4000
2	16000
3	8000

Extra

VBA provides hundreds of built-in constants that you can insert into your code at any point without declaring them. The Excel VBA object model adds over one thousand more, all of which begin with either `xl` or `vb`. Each constant has a numeric value. You can use these constants anywhere, and you do not need to know their numeric value to use them. Two of the most commonly used VBA constants deal with inserting carriage returns, `vbCrLf`, and tab characters, `vbTab`, in your output. Although each of these constants has a numeric equivalent, you simply type the name of the appropriate constant value in your code. To find a list of all VBA and Excel VBA Object Model constants, press F2 to view the Object Browser and search for Constant. Most of the constant values are self-explanatory, based on the name. Appendix A also includes many of the constant values used in this book. You can also find a listing of constants by typing **constant** in the Help text box.

Discover the Excel Object Model

Objects are the individual pieces of an application. For example, a worksheet is an object, a range of cells is an object, and a chart is an object. You can use the Excel object model to interact with the objects. Using the object model, you can access everything from the entire application to an individual cell in a worksheet. Objects can have properties and methods. You use *methods* to perform actions on objects, such as move an object. You use *properties* to change the characteristics of an object, such as the color of an object.

Excel has an enormous number of objects, properties, and methods, and remembering all of them is virtually impossible. Luckily, the VBE provides a help system to help you quickly locate objects and determine the corresponding methods and properties that are available for the object. You can learn how to work with objects by performing the tasks in this chapter.

Excel Objects

The Excel object model has several hundred objects and thousands of corresponding properties and methods. Each object represents an element of the Excel application. For example, the Application object refers to the entire Excel application, while the Worksheet object refers to an individual worksheet.

Most objects have child objects. A *child object* is an object that is part of a larger object. For example, a Worksheet object is a child object to a Workbook object because worksheets are part of a workbook. All objects in the Excel object model except the Application object is a child of at least one other object. The Excel Application object is the parent of all objects in Excel.

The object model groups common objects into collections. For example, the Workbook object identifies an individual workbook, but the Workbooks collection refers to all open workbooks.

Although the list of available objects is extensive, there are six objects that you use frequently: `Application`, `Workbook`, `Worksheet`, `Chart`, `Range`, and `Dialog`. Because you use these objects frequently, it is a good idea to familiarize yourself with them.

Application Object

You usually need to reference the parent object when referencing the child object. For example, to access the second worksheet in the current workbook, you would type `ThisWorkbook.Worksheets(2)`. The Application object represents the entire Excel program. All other objects are children of the Application object in the Excel object model. The Application object has several properties and methods. Those that return the most common user-interface values, such as the `ActiveCell` property, do not require the use of the Application object in the statement. Both of these statements are valid:

Example:

```
Application.ActiveCell
ActiveCell
```

Workbook Object

Every workbook you open in Excel is a `Workbook` object. Every `Workbook` object is part of the `Workbooks` collection. The `Workbooks` collection is part of the `Application` object. You can use the `Workbook` object methods to do things such as save or close a workbook. See Chapter 9 for more information on working with the `Workbook` object.

Worksheet Object

Every worksheet in Excel is a `Worksheet` object. Every `Worksheet` object is part of the `Worksheets` collection. You can use `Worksheet` methods to do things such as add, delete, or copy a worksheet. See Chapter 10 for more information about working with the `Worksheet` object.

Chart Object

Every chart in a workbook is a Chart object. You can embed a chart in a worksheet or you can place a chart on a chart sheet. The `ChartObject` object holds `Chart` objects you embed in a worksheet. `Chart` objects you place on a chart sheet are part of the `Charts` collection. All `ChartObject` objects are part of a `ChartObjects` object collection. See Chapter 13 for more information about working with charts.

Dialog Object

The `Dialog` object references each of the built-in dialog boxes available in Excel. Excel stores these dialog boxes in the `Dialogs` collection. VBA identifies each dialog box by assigning it a constant value. The constant value begins with `xlDialog` followed by the name of the dialog box. For example, `xlDialogSaveAs` references the Save As dialog box. You can use the constant value associated with a dialog box to view the dialog box. You view individual dialog boxes by using the `Show` method. The Dialog object refers to existing dialog boxes. For information on creating dialog boxes, see Chapter 13.

Excel Methods

Each object in the Excel object model has methods. You use methods to perform actions on objects For example, you can use the `Copy` method to copy a worksheet by copying the `Worksheet` object and placing it in another location in the workbook.

To use a method with an object, you combine the object name with the method name, as in the following example:

Example:

```
Worksheets(1).CopyAfter:=Worksheets(3)
```

Range Object

The `Range` object enables you to reference an individual cell or a range of cells. Several different methods and properties use `Range` objects. See Chapter 11 for more information on the `Range` object. The following references cell B3.

Example:

```
Range("B3")
```

Excel Properties

Each object in the Excel object model has properties. *Properties* enable you to view or change the characteristics of an object. For example, you can use the `Value` property to change the value of a cell. You can also use properties to change other aspects of an object. For example, you can use the `Hidden` property to hide or unhide a worksheet. To change an object property, you combine the object name with the property name and then assign a property, as follows:

Example:

```
Range("A1").Value = 45
```

Object Collections

You can have multiple objects of the same type, such as multiple worksheets in a workbook. To make these objects more accessible, VBA groups them together in an object collection. For example, each Workbook object contains a Worksheets collection. You access a collection in a manner similar to the way you access an array. You use an index value to reference the desired object in the collection. The following code accesses the second worksheet in the Worksheets collection:

Example:

```
Worksheets(2)
```

Glossary

TERM	DESCRIPTION
Object	An element in an application, such as a worksheet, chart, or form. You can use VBA to manipulate objects.
Properties	The characteristics of an object, such as its color, size, or location.
Methods	The actions VBA can perform on an object, such as copy, save, or move. For example, you can use methods to copy, save, or move a worksheet.

Access the Excel Object Model Reference

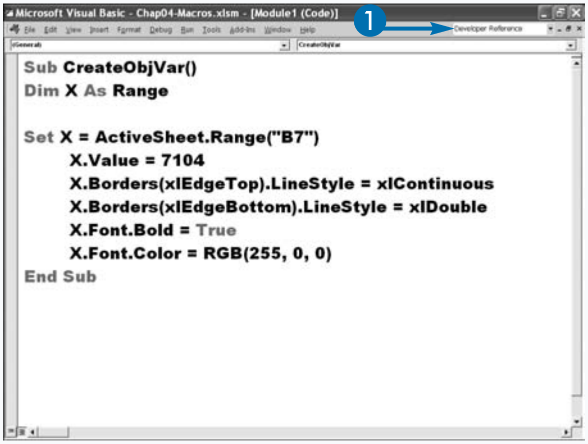
When you want to know what objects are available to you and the properties and methods associated these objects, you can refer to the Excel Object Model Reference, which is part of the VBA help system. The Excel Object Model Reference provides documentation on every object, method, property, and event in the Excel object model. An event occurs in Excel whenever the user performs any type of action. You can use events to trigger the execution of a procedure by creating event-handling procedures. See Chapter 15 to learn more about events.

The Excel Object Model Reference explains every object, and provides you with sample code. You can cut and paste the sample code into the VBE and then run it in Excel. The Excel Object Model Reference explains each method, provides you with the syntax for each method, explains the parameters associated with each method, and provides you with sample code for most methods. The Excel Object Model Reference also explains each object property and event and provides you with the syntax and sample code for most properties and events.

When using the Excel Object Model Reference, there are several ways you can access the information you want. You can type the name of an object, method, property, or event into the Search field and the Excel Object Model Reference will bring back a list of topics. Then you can click the topic in which you are interested. You also can select a topic from the Developer Reference Table of Contents, or you can use the Excel Object Model Reference to find the topic you want.

Access the Excel Object Model Reference

1. Type a question in the Help field in the upper-right corner of the VBE and then press Enter.

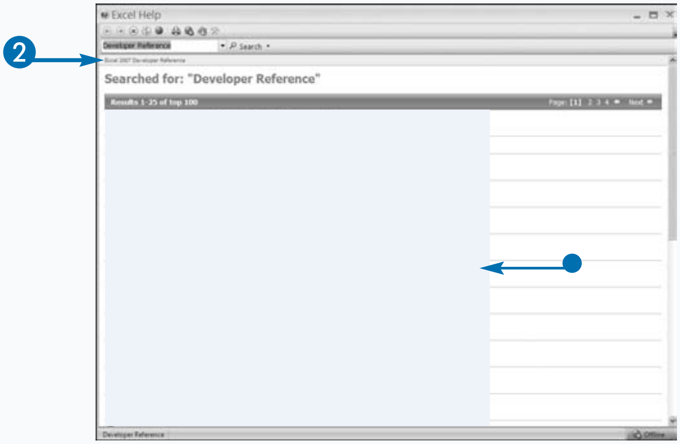

Microsoft Visual Basic - Chap04-Macros.xlsm - [Module1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
1
Developer Reference
(General)
CreateObjVar

```
Sub CreateObjVar()
Dim X As Range

Set X = ActiveSheet.Range("B7")
        X.Value = 7104
        X.Borders(xlEdgeTop).LineStyle = xlContinuous
        X.Borders(xlEdgeBottom).LineStyle = xlDouble
        X.Font.Bold = True
        X.Font.Color = RGB(255, 0, 0)
End Sub
```

The VBA Help system appears.

- You can select from the options in this menu.

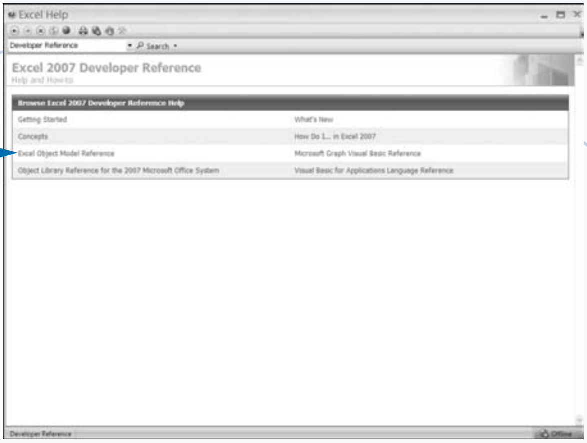
2. Click Excel 2007 Developer Reference at the top of the screen under the Search field.


Excel Help
Developer Reference
Search
2
Excel 2007 Developer Reference
Results 1-25 of top 100
Page: [1] 2 3 4 Next
Developer Reference
Offline

Searched for: "Developer Reference"

The Developer Reference Table of Contents appears.

③ Click Excel Object Model Reference.



Excel 2007 Developer Reference

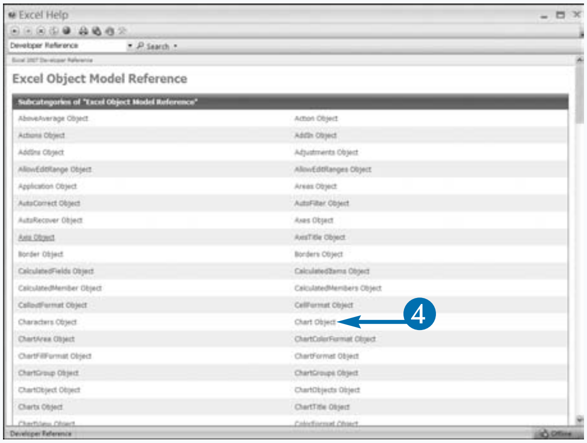
Help and How-to

Browse Excel 2007 Developer Reference Help	
Getting Started	What's New
Concepts	How Do I... in Excel 2007
Excel Object Model Reference	Microsoft Graph Visual Basic Reference
Object Library Reference for the 2007 Microsoft Office System	Visual Basic for Applications Language Reference

A list of the objects in the Excel object model appears.

④ Click the object for which you want more information.

A screen with links to the properties, methods, and events appears.



Excel Object Model Reference

Subcategories of "Excel Object Model Reference"	
AboveAverage Object	Action Object
Actions Object	AddIn Object
AddIns Object	Adjustments Object
AllowEditRange Object	AllowEditRanges Object
Application Object	Areas Object
AutoCorrect Object	AutoFilter Object
AutoRecover Object	Axes Object
Axis Object	AxisTitle Object
Border Object	Borders Object
CalculatedFields Object	CalculatedItems Object
CalculatedMember Object	CalculatedMembers Object
CalloutFormat Object	CellFormat Object
Characters Object	Chart Object
ChartArea Object	ChartColorFormat Object
ChartFillFormat Object	ChartFormat Object
ChartGroup Object	ChartGroups Object
ChartObject Object	ChartObjects Object
Charts Object	ChartTitle Object
ChartView Object	ColorFormat Object

Extra

You can use the Object Browser to access a list of objects, properties, and methods that are available for your use. You open the Object Browser by pressing F2, or by choosing View ➪ Object Browser from the menu while in the VBE. In the field in the upper-left corner of the browser, select Excel to access the Excel Object Model Reference. Use the Search field in the upper-left corner to search for the object for which you are looking.

If you place your cursor over a keyword in your code and then right-click, a contextual menu appears. Click List Properties/Methods to see a list of properties or methods that you can use with the keyword. Click List Constants to see a list of constants that you can use with the keyword. Click Parameter Info to see a list of parameters.

As you type your code, the VBE provides you with a list of properties, methods, and constants that you can use with the object for which you are creating a command.

Create an Object Variable

You can reference objects by typing the complete object reference each time you want to reference the object, or you can assign an object to a variable. You assign objects to variables because variable names are usually shorter and easier to remember, and you can change the objects that variables refer to while your code is running. In addition, VBA code runs faster when you use object variables.

You declare object variables in much the same way as you declare a standard variable. You use the Dim statement to declare the variable and the As statement to identify the variable as an object variable. The data type for the variable is the corresponding object type. For example, the statement `Dim SampleVar As Worksheet` creates an object variable named `SampleVar` that is a `Worksheet` object.

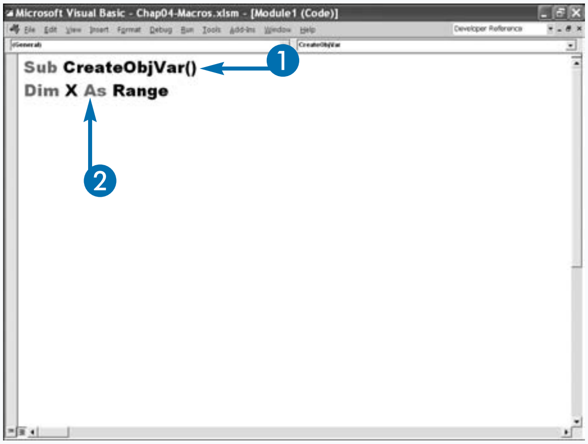
After you create an object variable, you assign an object to the variable by using a `Set` statement. The following statement sets the value of `SampleVar` to point to `Sheet1` in your workbook:

```
Set SampleVar = ActiveWorkbook
    .Worksheets("Sheet1")
```

When you assign an object to a variable, you are assigning a reference to the object to the variable and not the actual object value. For example, when you assign a range to a variable *without* using a Set statement, you are assigning the value in the cell to the variable. When you assign a range to a variable using a Set statement, you reference the actual cells. Assigning a range to a variable by using the Set statement allows you to set properties for the range using the variable.

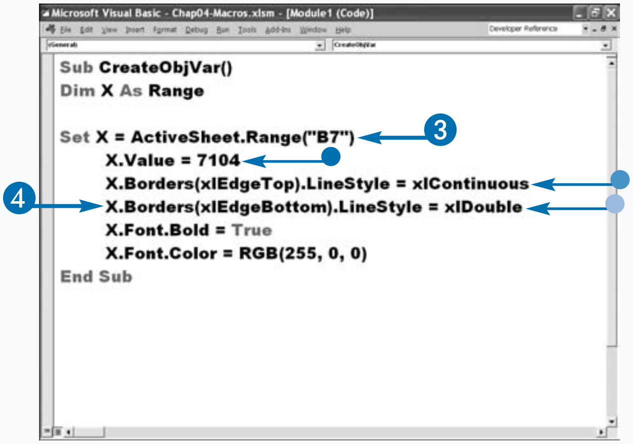
Create an Object Variable

1. Name your procedure.
2. Declare your object variable.


Microsoft Visual Basic - Chap04-Macros.xlsm - [Module1 (Code)]
(General)
CreateObjVar
1
2

```
Sub CreateObjVar()
Dim X As Range
```

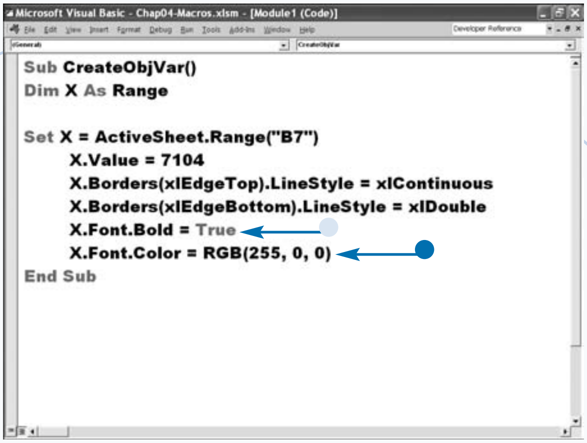
3. Use a `Set` statement to assign an object to the variable you created.
4. Assign the object properties.
   - Assigns a value to a cell.
   - Places a single line border at the top of the cell.
   - Places a double line border at the bottom of the cell.


Microsoft Visual Basic - Chap04-Macros.xlsm - [Module1 (Code)]
(General)
CreateObjVar
3
4

```
Sub CreateObjVar()
Dim X As Range

Set X = ActiveSheet.Range("B7")
    X.Value = 7104
    X.Borders(xlEdgeTop).LineStyle = xlContinuous
    X.Borders(xlEdgeBottom).LineStyle = xlDouble
    X.Font.Bold = True
    X.Font.Color = RGB(255, 0, 0)
End Sub
```

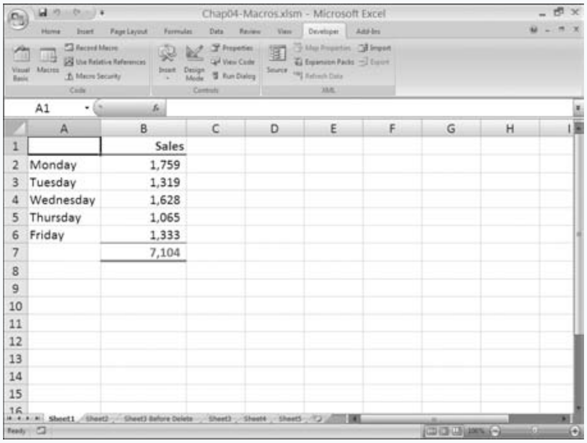
- Makes the font bold.
- Makes the font color red.

5. Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap04-Macros.xlsm - [Module1 (Code)]
(General)
CreateObjVar

```
Sub CreateObjVar()
Dim X As Range

Set X = ActiveSheet.Range("B7")
    X.Value = 7104
    X.Borders(xlEdgeTop).LineStyle = xlContinuous
    X.Borders(xlEdgeBottom).LineStyle = xlDouble
    X.Font.Bold = True
    X.Font.Color = RGB(255, 0, 0)
End Sub
```

The macro places the value you specified in the cell you specified, adds a single-line border to the top of the cell, adds a double-line border to the bottom of the cell, makes the font bold, and sets the font color to red.



	A	B
1		Sales
2	Monday	1,759
3	Tuesday	1,319
4	Wednesday	1,628
5	Thursday	1,065
6	Friday	1,333
7		7,104

Extra

If you want to refer to the currently selected worksheet, you can use the `ActiveSheet` property. You can use this property in place of an object reference to the worksheet, such as `Worksheets(1)`, which refers to the first worksheet in a workbook. By using the `ActiveSheet` property, you reference the active worksheet at the time your procedure executes. For example, `SheetName = ActiveSheet.Name` assigns the name of the currently active worksheet to the `SheetName` variable.

The `ActiveSheet` property can refer to any type of sheet within a workbook. Therefore, if the currently selected sheet is actually a chart sheet, the `ActiveSheet` property returns a reference to the chart sheet. See Chapter 10 for more information on working with worksheets.

When you create object variables, you are essentially creating object pointers. Unlike a standard variable, which is the name of a memory location containing the variable's value, an object variable actually points to the memory location that stores a pointer to the object. For example, in the following code, `ObjVar` stores the pointer to cell B2 in the worksheet.

Example:

```
Dim ObjVar As Range
Set ObjVar = ActiveSheet.Cells(2, 2)
```

Change the Properties of an Object

You can change the value of an object, its appearance, and other characteristics by modifying the properties associated with the object. For example, when working with a cell on a worksheet, you use the Value property to change the value of the cell. If you want to change the font style, you modify Font object properties, such as Bold, Italic, Underline, and Size.

If you want to make several property changes to the same object, you can create a statement for each property you want to change. For example, you can enter the following statements to change the properties of a cell:

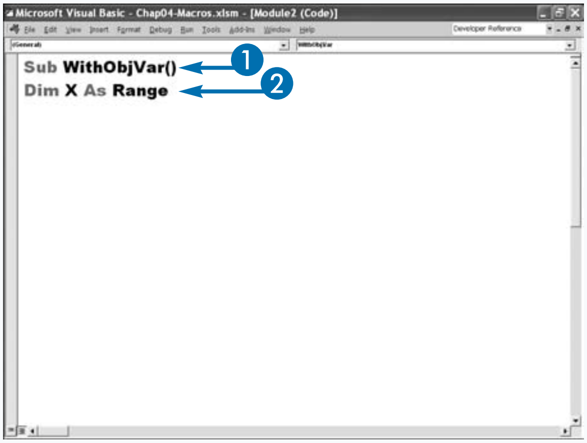
```
ActiveSheet.Range("B7").Value = 7104

ActiveSheet.Range("B7").Borders_
(xlEdgeBottom).LineStyle = xlDouble

ActiveSheet.Range("B7").Borders_
(xlEdgeTop).LineStyle = xlContinuous

ActiveSheet.Range("B7").Font.Bold = True

ActiveSheet.Range("B7").Font._
Color = RGB(255,0,0)
```

You can simplify these statements by assigning `ActiveSheet.Range("B7")` to an object variable and then referencing the variable for each statement. For example, you can assign `ActiveSheet.Range("B7")` to the variable X.

You can simplify the statements even further by using a `With` statement. Instead of typing the object variable reference, you simply type `With` *`VariableName`* followed by each property statement. When you complete your list of property settings, you type `End With` to mark the end of your `With` statement. You can nest your `With` statements to further simplify your code.

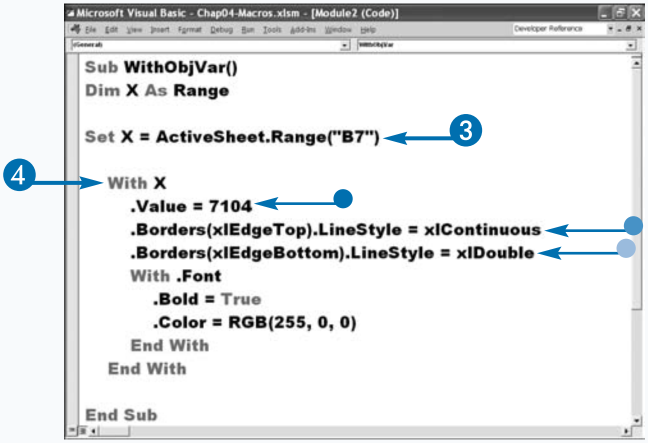
Change the Properties of an Object

1. Name your procedure.
2. Declare your object variable.


Microsoft Visual Basic - Chap04-Macros.xlsm - [Module2 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Developer Reference
(General)
WithObjVar
1
2

```
Sub WithObjVar()
Dim X As Range
```

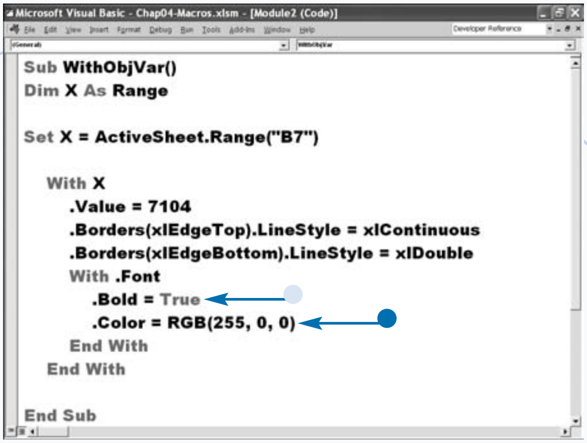
3. Use a `Set` statement to assign an object to the variable you created.
4. Assign the object properties by using a `With` statement.
   - Assigns a value to a cell.
   - Places a single line border at the top of the cell.
   - Places a double line border at the bottom of the cell.


Microsoft Visual Basic - Chap04-Macros.xlsm - [Module2 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Developer Reference
(General)
WithObjVar
3
4

```
Sub WithObjVar()
Dim X As Range

Set X = ActiveSheet.Range("B7")

  With X
    .Value = 7104
    .Borders(xlEdgeTop).LineStyle = xlContinuous
    .Borders(xlEdgeBottom).LineStyle = xlDouble
    With .Font
      .Bold = True
      .Color = RGB(255, 0, 0)
    End With
  End With

End Sub
```

- Makes the font bold.
- Makes the font color red.

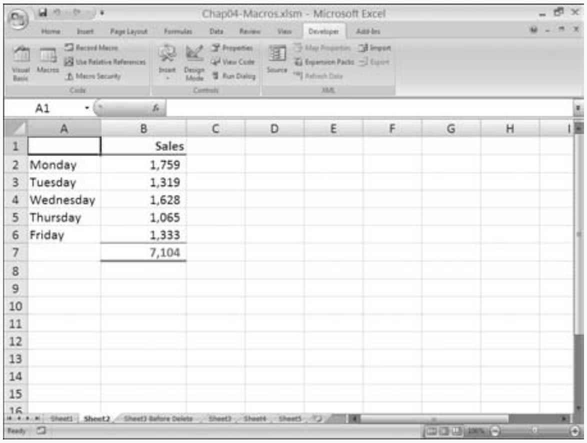
5. Press Alt+F11 to switch from the VBE to Excel, and run the macro.



```
Sub WithObjVar()
Dim X As Range

Set X = ActiveSheet.Range("B7")

    With X
        .Value = 7104
        .Borders(xlEdgeTop).LineStyle = xlContinuous
        .Borders(xlEdgeBottom).LineStyle = xlDouble
        With .Font
            .Bold = True
            .Color = RGB(255, 0, 0)
        End With
    End With

End Sub
```

Microsoft Visual Basic - Chap04-Macros.xlsm - [Module2 (Code)]
(General)
WithObjVar

The macro places the value you specified in the cell you specified, adds a single-line border to the top of the cell, adds a double-line border to the bottom of the cell, makes the font bold, and sets the font color to red.



Chap04-Macros.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
A1
Sheet1
Sheet2
Sheet3 Before Delete
Sheet3
Sheet4
Sheet5
Ready

	A	B
1		Sales
2	Monday	1,759
3	Tuesday	1,319
4	Wednesday	1,628
5	Thursday	1,065
6	Friday	1,333
7		7,104

Extra

Some objects, such as the `Font` object, have a `Color` property that determines the color of the object. You can use the `RGB` function to set the font color. When you use this function, you select the desired color by indicating the amount of red, green, and blue in the color. You specify the color values with an integer value between 0 and 255. For example, you type **(0,0,0)** for the color black.

COLOR	RED VALUE	GREEN VALUE	BLUE VALUE
Black	0	0	0
Blue	0	0	255
Cyan	0	255	255
Green	0	255	0
Magenta	255	0	255
Red	255	0	0
White	255	255	255
Yellow	255	255	0

Compare Object Variables

You can use an object comparison to determine if two object variables reference the same object. Unlike standard variables, which actually contain values that you can compare, the object variable does not contain the object, but references it. When you compare two object variables, you are checking to see if they point to the same object. For example, you may want to find out if the currently active worksheet is the first worksheet. If so, you can perform an object comparison.

When you compare standard variables, you use the equals (=) operator to determine if they are the same. For example, `If Value1 = Value2 Then` compares two standard variables. See Chapter 3 for more information on working with standard variables.

When comparing objects, instead of the equals operator, you use the `Is` operator. For example, you write an `If Then` statement to compare two object variables as follows:

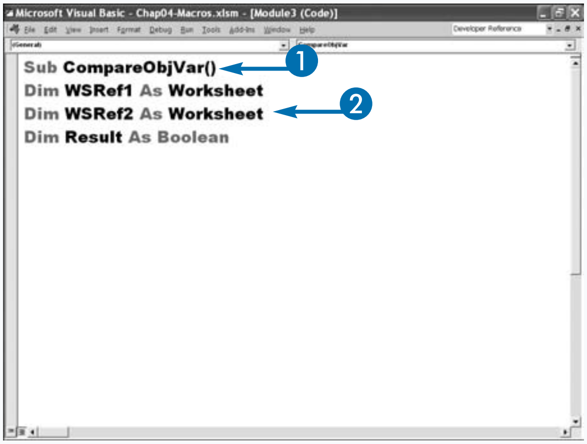
```
If ObjVal1 Is ObjVal2 Then
```

This statement looks at the object referenced by `ObjVal1` and checks to see if it is the same as the object referenced by `ObjVal2`.

In addition to comparing two objects, you can also use the `Is` operator to determine if an object variable has an assigned value, as shown in the following example: `If ObjVal1 Is Nothing Then`. This comparison statement returns a value of `True` if the object variable does not point to an object. If the object variable points to an object, the comparison statement returns a value of `False`.

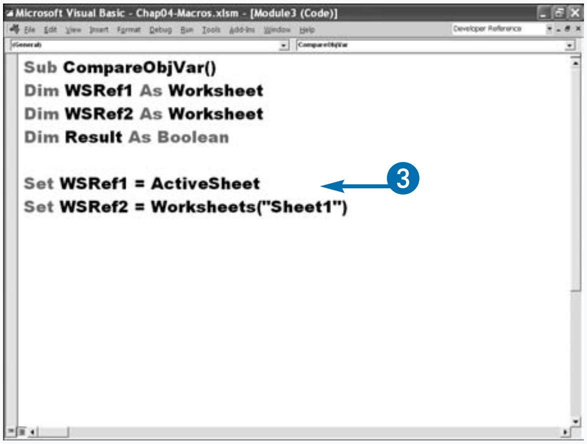
Compare Object Variables

1. Name your procedure.
2. Declare your variables.


Microsoft Visual Basic - Chap04-Macros.xlsm - [Module3 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Developer Reference
(General)
CompareObjVar
1
2

```
Sub CompareObjVar()
Dim WSRef1 As Worksheet
Dim WSRef2 As Worksheet
Dim Result As Boolean
```

3. Assign objects to your object variables.

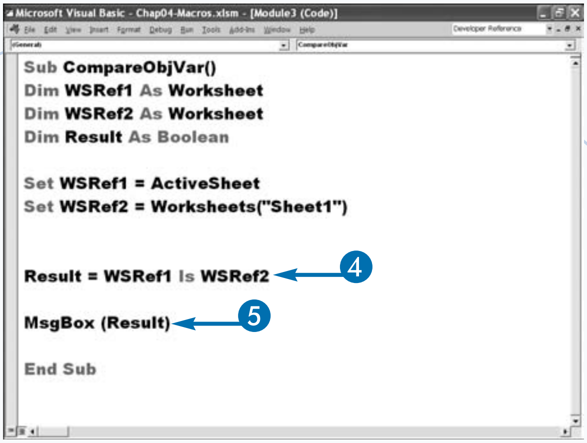

Microsoft Visual Basic - Chap04-Macros.xlsm - [Module3 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Developer Reference
(General)
CompareObjVar
3

```
Sub CompareObjVar()
Dim WSRef1 As Worksheet
Dim WSRef2 As Worksheet
Dim Result As Boolean

Set WSRef1 = ActiveSheet
Set WSRef2 = Worksheets("Sheet1")
```

④ Compare the objects and assign the result to a variable.

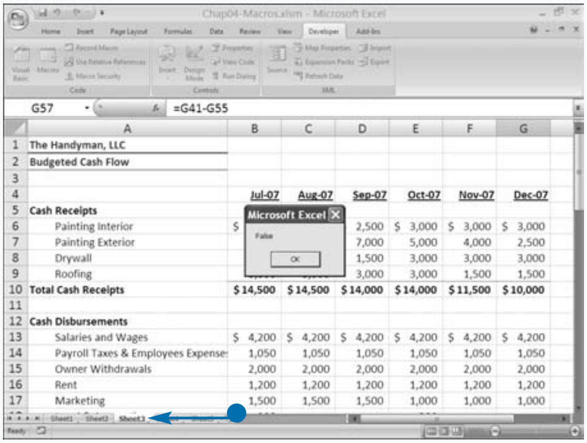
⑤ Display the result using the MsgBox function.

⑥ Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap04-Macros.xlsm - [Module3 (Code)]
(General)
CompareObjVar
4
5

```
Sub CompareObjVar()
Dim WSRef1 As Worksheet
Dim WSRef2 As Worksheet
Dim Result As Boolean

Set WSRef1 = ActiveSheet
Set WSRef2 = Worksheets("Sheet1")


Result = WSRef1 Is WSRef2

MsgBox (Result)

End Sub
```

- If you are on Sheet1, the macro returns the value True; otherwise, it returns the value False.


Chap04-Macros.xlsm - Microsoft Excel
Home
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G57
=G41-G55
Microsoft Excel
False
OK
Sheet1
Sheet2
Sheet3
Ready

	A	B	C	D	E	F	G
1	The Handyman, LLC						
2	Budgeted Cash Flow						
3							
4		Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07
5	Cash Receipts						
6	Painting Interior	$		2,500	$ 3,000	$ 3,000	$ 3,000
7	Painting Exterior			7,000	5,000	4,000	2,500
8	Drywall			1,500	3,000	3,000	3,000
9	Roofing			3,000	3,000	1,500	1,500
10	Total Cash Receipts	$ 14,500	$ 14,500	$ 14,000	$ 14,000	$ 11,500	$ 10,000
11							
12	Cash Disbursements						
13	Salaries and Wages	$ 4,200	$ 4,200	$ 4,200	$ 4,200	$ 4,200	$ 4,200
14	Payroll Taxes & Employees Expense:	1,050	1,050	1,050	1,050	1,050	1,050
15	Owner Withdrawals	2,000	2,000	2,000	2,000	2,000	2,000
16	Rent	1,200	1,200	1,200	1,200	1,200	1,200
17	Marketing	1,500	1,500	1,500	1,000	1,000	1,000

Extra

You can also use the `Is` operator with the `Nothing` keyword to ensure that an object variable points to a valid object. You can compare the value of the object variable to the Nothing keyword by using an `If Then` statement, as shown in the following example. If the `If Then` statement returns a value of `True`, the object variable does not contain a reference to a valid object.

Example:

```
If ObjVar Is Nothing Then
      MsgBox ("Variable does not point to a valid object.")
End If
```

You can use the Nothing keyword to clear the object variable. By doing so, you free up the memory required to store the object pointer in the object variable.

Example:

```
Set ObjVar = Nothing
```

Using an Object Method

You use Excel object methods to modify or perform an action on an object. The Excel object model contains several hundred objects, and each object has a list of methods you can use with it. For example, you can use the Copy method to copy a Worksheet object and then place the copy in another location in your workbook.

To use an object method, you specify the appropriate object, followed by a period and the method you want to use. If the selected method has arguments, you place the arguments after the method.

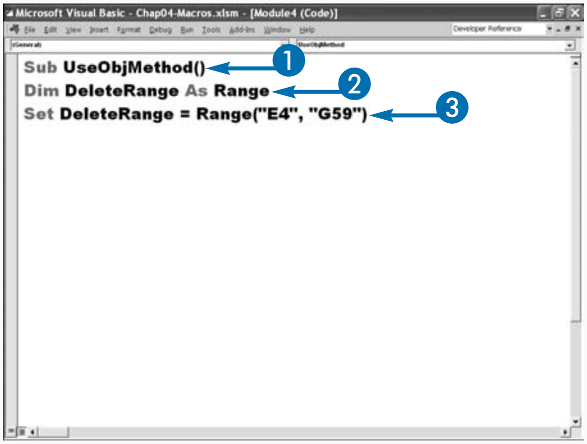
Example:

```
Worksheet("Sheet2").Copy Before:= Worksheet("Sheet1")
```

In this example, the code copies Sheet2 and places the copy before Sheet1 in the current workbook. `Worksheet("Sheet2")` is the object, `Copy` is the method, and `Before:= Worksheet("Sheet1")` is the argument.

Most methods take arguments. Arguments tell VBA how to modify the object. Usually, at least one argument is required. In this example, the Copy method requires you use either the Before or After argument to tell VBA where to place the copied worksheet. Use the `Before` argument to tell VBA the sheet before which you want to place the copied worksheet. Use the `After` argument to tell VBA the sheet after which you want to place the copied worksheet. See Chapter 10 for more information about copying Excel worksheets.

Using an Object Method

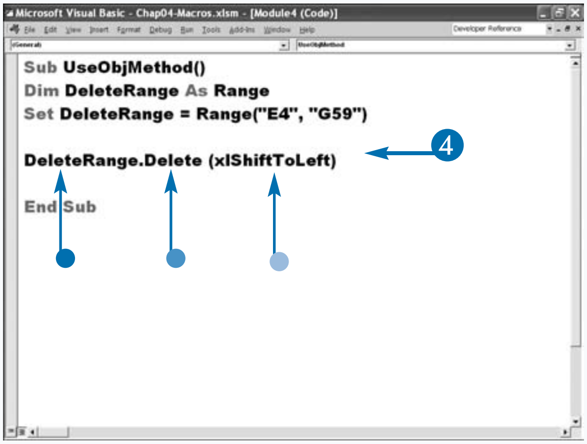

Microsoft Visual Basic - Chap04-Macros.xlsm - [Module4 (Code)]
(General)
UseObjMethod
1
2
3

```
Sub UseObjMethod()
Dim DeleteRange As Range
Set DeleteRange = Range("E4", "G59")
```

① Name your procedure.

② Declare a Range object variable.

③ Store an object to an object variable.


Microsoft Visual Basic - Chap04-Macros.xlsm - [Module4 (Code)]
(General)
UseObjMethod
4

```
Sub UseObjMethod()
Dim DeleteRange As Range
Set DeleteRange = Range("E4", "G59")

DeleteRange.Delete (xlShiftToLeft)

End Sub
```

④ Use a method to perform an action on an object.

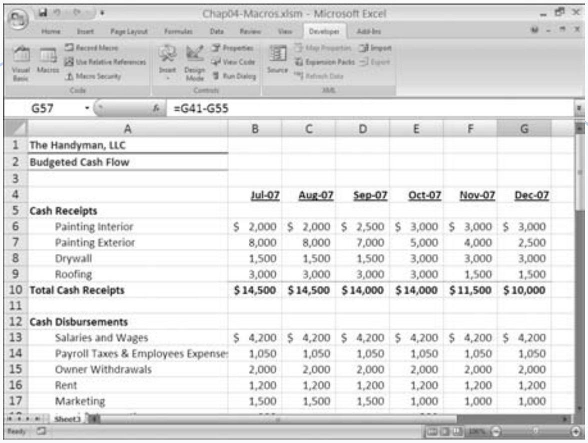
In this example, you use the Delete method to delete a range.

- The Range object.
- The Delete method.
- Assigns arguments to the method.

This argument is a constant that tells VBA to shift cells to the left after deleting.

⑤ Press Alt+F11 to switch from the VBE to Excel, and run the macro.

The worksheet before you run the macro.


Chap04-Macros.xlsm - Microsoft Excel
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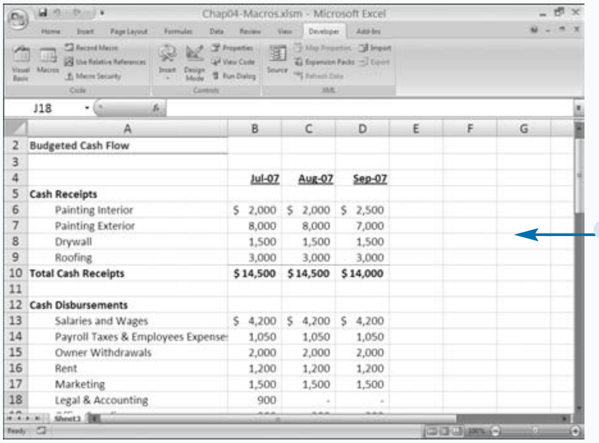
Record Macro
Use Relative References
Macro Security
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
G57
Sheet1
Ready

=G41-G55

	A	B	C	D	E	F	G
1	The Handyman, LLC						
2	Budgeted Cash Flow						
3							
4		Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07
5	Cash Receipts						
6	Painting Interior	$ 2,000	$ 2,000	$ 2,500	$ 3,000	$ 3,000	$ 3,000
7	Painting Exterior	8,000	8,000	7,000	5,000	4,000	2,500
8	Drywall	1,500	1,500	1,500	3,000	3,000	3,000
9	Roofing	3,000	3,000	3,000	3,000	1,500	1,500
10	Total Cash Receipts	$ 14,500	$ 14,500	$ 14,000	$ 14,000	$ 11,500	$ 10,000
11							
12	Cash Disbursements						
13	Salaries and Wages	$ 4,200	$ 4,200	$ 4,200	$ 4,200	$ 4,200	$ 4,200
14	Payroll Taxes & Employees Expense:	1,050	1,050	1,050	1,050	1,050	1,050
15	Owner Withdrawals	2,000	2,000	2,000	2,000	2,000	2,000
16	Rent	1,200	1,200	1,200	1,200	1,200	1,200
17	Marketing	1,500	1,500	1,500	1,000	1,000	1,000

The worksheet after you run the macro.

- The macro deletes the range.


Chap04-Macros.xlsm - Microsoft Excel
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Use Relative References
Macro Security
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
J18
Sheet1
Ready

	A	B	C	D	E	F	G
2	Budgeted Cash Flow						
3							
4		Jul-07	Aug-07	Sep-07			
5	Cash Receipts						
6	Painting Interior	$ 2,000	$ 2,000	$ 2,500			
7	Painting Exterior	8,000	8,000	7,000			
8	Drywall	1,500	1,500	1,500			
9	Roofing	3,000	3,000	3,000			
10	Total Cash Receipts	$ 14,500	$ 14,500	$ 14,000			
11							
12	Cash Disbursements						
13	Salaries and Wages	$ 4,200	$ 4,200	$ 4,200			
14	Payroll Taxes & Employees Expense:	1,050	1,050	1,050			
15	Owner Withdrawals	2,000	2,000	2,000			
16	Rent	1,200	1,200	1,200			
17	Marketing	1,500	1,500	1,500			
18	Legal & Accounting	900	-	-			

Extra

You can use named arguments with functions, methods, and statements. Using named arguments is an easier way to supply your functions, methods, and statements with the arguments, especially when a large number of arguments are required. If you do not use a named argument, you supply arguments by placing them after the method, enclosed in parentheses and separated by commas in the order VBA expects them. For example, the Worksheet object Protect method has 16 optional arguments. If you do not use named arguments, then calling this property requires a placeholder for each argument to specify a value for the last parameter, as shown in this example:

Example:

```
Worksheets(1).Protect("Excel", , , , , , , , , , , , ,True,)
```

If you use named arguments, you can provide the arguments in any order. You assign a value to the argument by using a colon followed by an equals sign (:=).

Example:

```
Worksheets(1).Protect Password:= _
"Excel", AllowFiltering:=True
```

Display a Built-in Dialog Box

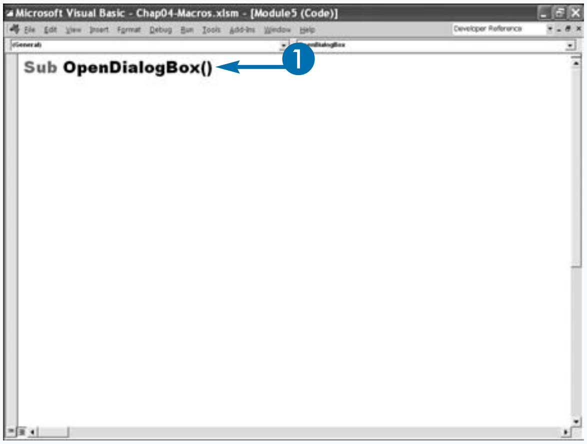
You can incorporate code into your procedure that opens a built-in Excel dialog box. The Excel object model contains a `Dialog` object for each Excel dialog box. These objects are part of the `Dialogs` collection. You can access each of the Excel dialog box objects by specifying its constant value. The constant value for each dialog box begins with `xlDialog` followed by the name of the dialog box. For example, the constant for the Excel Save As dialog box is `xlDialogSaveAs`.

You can find a complete list of the dialog box constants in the help that comes with the VBE, by typing `XlBuiltInDialog` in the Search field and then clicking `XlBuiltInDialog Enumeration`.

You use the `Show` method to display a built-in dialog box. You cannot access the values that a user places in the fields. You can only determine what the user selects by looking at the results after the user dismisses the dialog box. You can use arguments to assign values to a dialog box. For example, the Properties dialog box (`xlDialogProperties`) has the following arguments: `Title`, `Subject`, `Author`, `Keywords`, and `Comments`. You can enter the values for these arguments before you open your dialog box. For a list of the arguments associated with each dialog box, type “Built-In Dialog Box Arguments List” in the Search field and then, in the list of options that appears, click Built-In Dialog Box Arguments Lists. If you want to use named arguments to assign values to the arguments, use `Arg1` for the first argument, `Arg2` for the second argument, and continue in this manner. For example, if you are working with the `xlDialogProperties` dialog box, you can use `Arg1` for Title and `Arg2` for Subject.

Display a Built-in Dialog Box

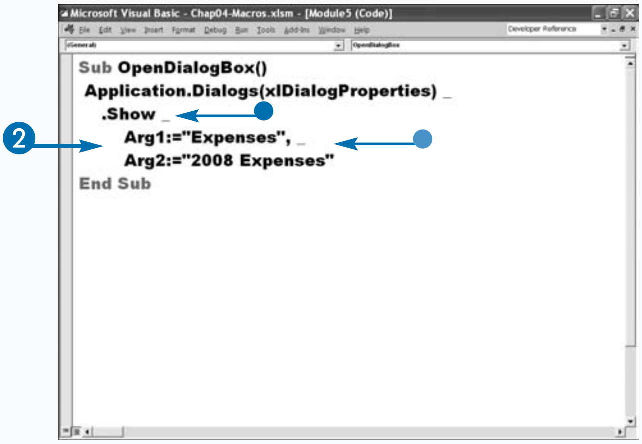
1. Create a new procedure.


Microsoft Visual Basic - Chap04-Macros.xlsm - [Module5 (Code)]
(General)
OpenDialogBox
1

```
Sub OpenDialogBox()
```

2. Type your command.

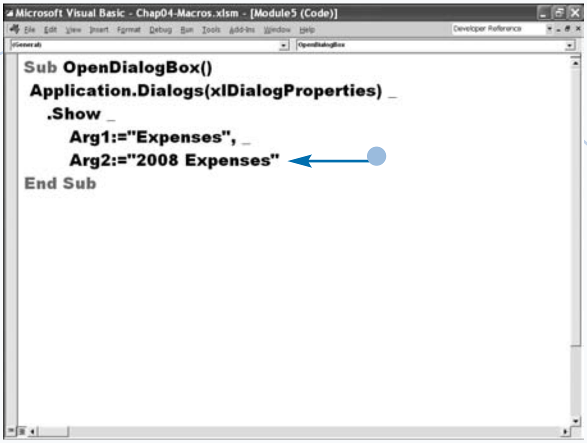
- The Show method.
- The title.


Microsoft Visual Basic - Chap04-Macros.xlsm - [Module5 (Code)]
(General)
OpenDialogBox
2

```
Sub OpenDialogBox()
 Application.Dialogs(xlDialogProperties) _
   .Show _
      Arg1:="Expenses", _
      Arg2:="2008 Expenses"
End Sub
```

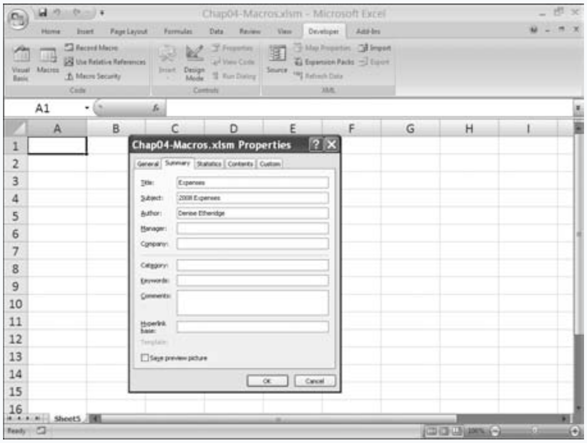
- The subject.

③ Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap04-Macros.xlsm - [Module5 (Code)]
(General)
OpenDialogBox

```
Sub OpenDialogBox()
 Application.Dialogs(xlDialogProperties) _
   .Show _
      Arg1:="Expenses", _
      Arg2:="2008 Expenses"
End Sub
```

The macro adds the arguments to the dialog box and then opens the dialog box.


Chap04-Macros.xlsm - Microsoft Excel
Chap04-Macros.xlsm Properties
General
Summary
Statistics
Contents
Custom
OK
Cancel

Title: Expenses
Subject: 2008 Expenses
Author: Denise Etheridge
Manager:
Company:
Category:
Keywords:
Comments:
Hyperlink base:
Template:
☐ Save preview picture

Extra

Excel has hundreds of dialog boxes that display throughout the application. You can display them by using the appropriate constant. The following table lists a few of the most commonly used Excel dialog boxes:

CONSTANT	DISPLAYS
`xlDialogFileDelete`	The Delete dialog box, where you select files to remove.
`xlDialogInsert`	The Insert dialog box for adding additional cells to a worksheet.
`xlDialogNew`	The New dialog box.
`xlDialogOpen`	The Open dialog box.
`xlDialogPrint`	The Print dialog box.
`xlDialogSaveAs`	The Save As dialog box.

Declare an Array

If you have a group of related values of the same data type, you can declare them as an array. You declare an array in much the same way you declare other variables and, as with other variables, you can declare arrays as either local or global. You set the scope of an array with the `Dim` or `Public` statement. See the section, “Understanding Variables and Data Types,” in Chapter 3 for more information about setting the scope of a variable.

You can use arrays to store a group of related data. Using arrays simplifies your code because you can use one variable to store several values. For example, you can declare an array and use it to store all 12 months of the year instead of creating a separate variable for each month.

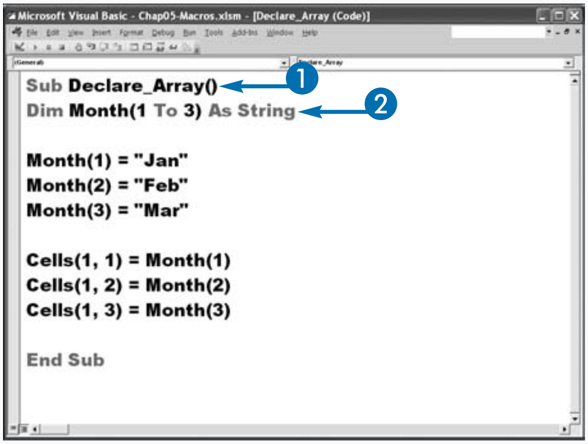
When you declare an array, you specify the number of elements in the array. For example, the declaration `Dim Month(1 To 12) As String` declares 12 elements numbered sequentially 1 through 12. In the example, the Month array has 12 elements with a lower bound of 1 and an upper bound of 12.

An element is a data value in the array. You access the elements in an array by using the index value that represents the desired element. Elements are sequentially numbered The lower bound of an array is the lowest index value, and the upper bound of an array is the highest index value. To access the second element of the Month array, use the index value of 2, as in `Month(2)`.

Declare an Array

1. Name your procedure.
2. Declare your array.

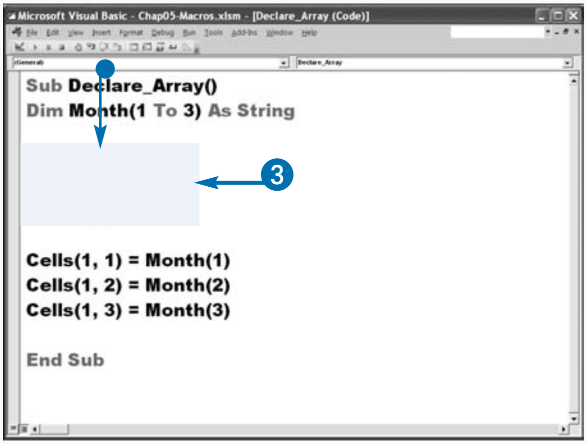
***Note:** For more information on data types, see Chapter 3.*


Microsoft Visual Basic - Chap05-Macros.xlsm - [Declare_Array (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
Declare_Array
1
2

```
Sub Declare_Array()
Dim Month(1 To 3) As String

Month(1) = "Jan"
Month(2) = "Feb"
Month(3) = "Mar"

Cells(1, 1) = Month(1)
Cells(1, 2) = Month(2)
Cells(1, 3) = Month(3)

End Sub
```

3. Assign values to the array elements.

- A number enclosed in parentheses identifies each element.


Microsoft Visual Basic - Chap05-Macros.xlsm - [Declare_Array (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
Declare_Array
3

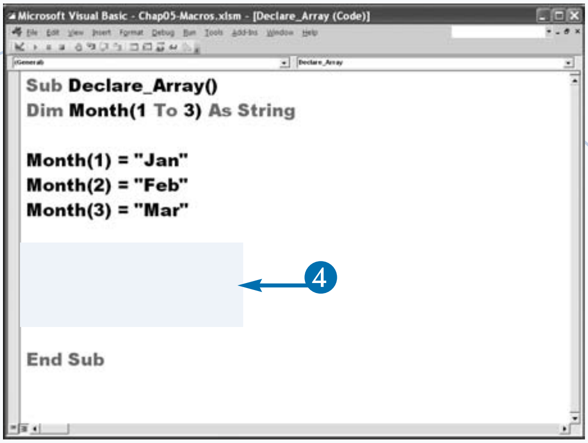
```
Sub Declare_Array()
Dim Month(1 To 3) As String




Cells(1, 1) = Month(1)
Cells(1, 2) = Month(2)
Cells(1, 3) = Month(3)

End Sub
```

④ Use the Cells method to assign the values in the array to cells in the spreadsheet.

Note: *For more information, see the section, "Reference Cells and Ranges," in Chapter 3.*

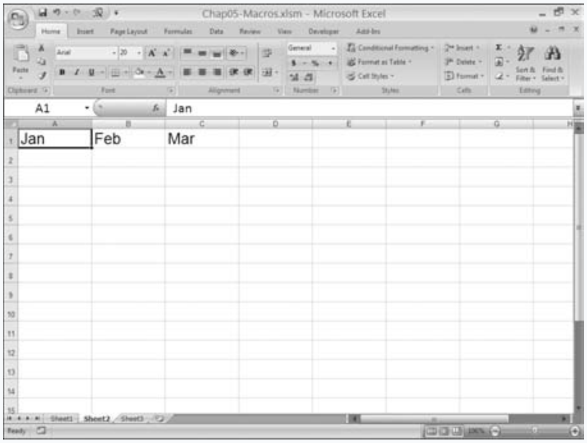
⑤ Press Alt+F11 to switch from the VBE to Excel, and run the macro.

Note: *See Chapter 1 to learn how to run a macro.*


Microsoft Visual Basic - Chap05-Macros.xlsm - [Declare_Array (Code)]
(General)
Declare_Array
4

```
Sub Declare_Array()
Dim Month(1 To 3) As String

Month(1) = "Jan"
Month(2) = "Feb"
Month(3) = "Mar"



End Sub
```

Excel places the values in the array in the specified cell.



	A	B	C
1	Jan	Feb	Mar

Extra

When you specify the size of an array, you indicate the upper and lower bounds of the array, or the first and last index values. In the example, `Dim NewArray(1 To 45)`, the statement creates an array with 45 elements with a lower bound of 1 and an upper bound of 45. You can omit the lower bound value when you declare an array, as in the example, `Dim NewArray(45)`. If you do not specify the lower bound, VBA assigns a lower bound value of 0. Therefore, the array NewArray actually has 46 elements starting with the first element 0 and ending with the final element 45.

If you want all your arrays to have a lower bound value of 1, place the following statement before any procedures in your module: `Option Base 1`. Making your arrays one-based is desirable because Microsoft Excel collections are one-based and the arrays that Excel methods and properties return are one-based. If your arrays are also one-based, your code will be easier to debug.

Declare a Multidimensional Array

You can use a multidimensional array to store related values within one array. VBA allows you to create arrays with up to 60 dimensions. However, working with arrays that have more than two or three dimensions can be difficult.

By using multidimensional arrays, you can store related values in one location. For example, you can store team numbers and game scores. The first dimension of the array can contain the team's number, and the second dimension can contain the team's score.

To help envision a multidimensional array, try thinking of a two-dimensional array as a worksheet, with rows and columns. You access each element of the array by specifying two index values. For example, `MultiArray(1,2)` accesses the value whose first dimension index is 1 and whose second dimension index is 2.

As you add a third dimension to an array, it gains depth. Using the worksheet example, you can add a third dimension to the two-dimensional array to make it resemble a cube. Accessing an element of the array now requires three index values, as in the example, `MultiArray(1,2,2)`.

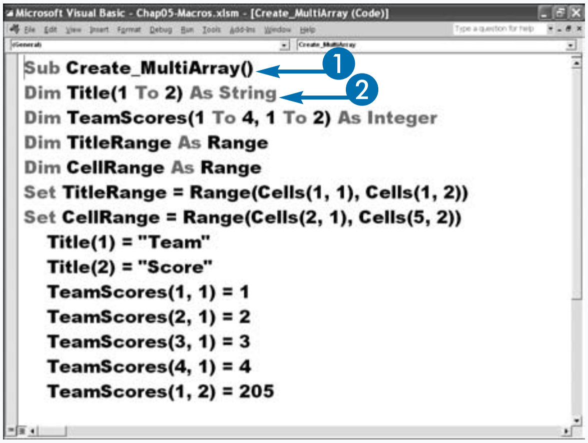
As with other variables, you use the `Dim` statement to declare procedure-only arrays and module-only arrays, and the `Public` statement for arrays that are accessible to the entire workbook.

When you declare a multidimensional array, you indicate the size of each dimension in the array. You do not have to make the dimensions in the array equal. In the example, `Dim MultiArray(1 To 4, 1 To 5, 1 To 3)`, the array contains four elements in the first dimension, five in the second, and three in the third.

Declare a Multidimensional Array

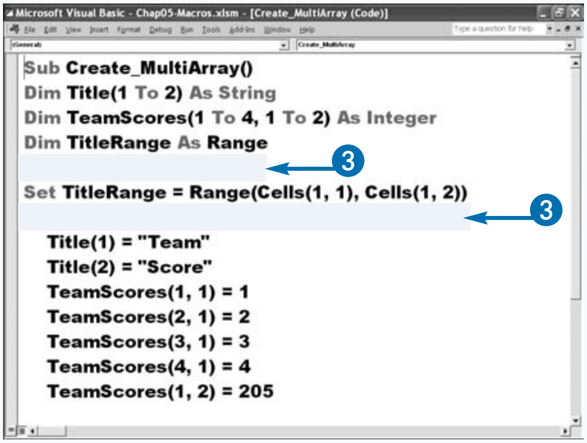
① Name your procedure.

② Declare your array.


Microsoft Visual Basic - Chap05-Macros.xlsm - [Create_MultiArray (Code)]
(General)
Create_MultiArray
1
2

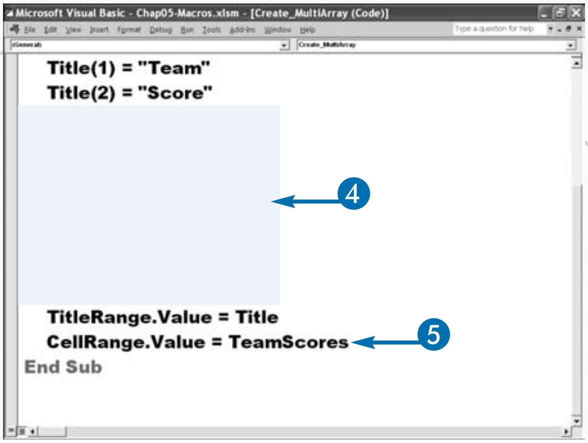
```
Sub Create_MultiArray()
Dim Title(1 To 2) As String
Dim TeamScores(1 To 4, 1 To 2) As Integer
Dim TitleRange As Range
Dim CellRange As Range
Set TitleRange = Range(Cells(1, 1), Cells(1, 2))
Set CellRange = Range(Cells(2, 1), Cells(5, 2))
    Title(1) = "Team"
    Title(2) = "Score"
    TeamScores(1, 1) = 1
    TeamScores(2, 1) = 2
    TeamScores(3, 1) = 3
    TeamScores(4, 1) = 4
    TeamScores(1, 2) = 205
```

③ Specify the range in your Excel worksheet in which VBA will place the contents of your array.


Microsoft Visual Basic - Chap05-Macros.xlsm - [Create_MultiArray (Code)]
(General)
Create_MultiArray
3
3

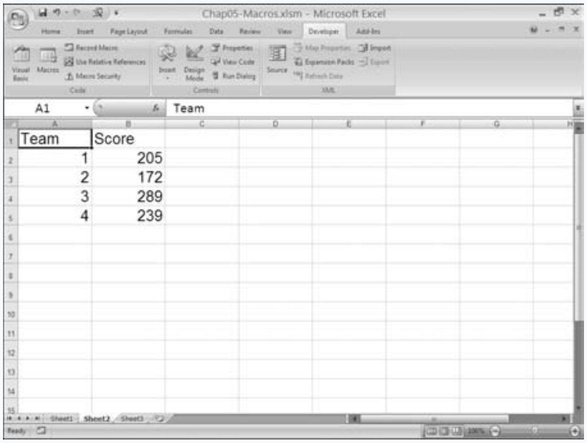
```
Sub Create_MultiArray()
Dim Title(1 To 2) As String
Dim TeamScores(1 To 4, 1 To 2) As Integer
Dim TitleRange As Range

Set TitleRange = Range(Cells(1, 1), Cells(1, 2))

    Title(1) = "Team"
    Title(2) = "Score"
    TeamScores(1, 1) = 1
    TeamScores(2, 1) = 2
    TeamScores(3, 1) = 3
    TeamScores(4, 1) = 4
    TeamScores(1, 2) = 205
```

4. Assign values to the array elements.
5. Assign the array values to the cells you specified in step 3.
6. Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap05-Macros.xlsm - [Create_MultiArray (Code)]
(General)
Create_MultiArray
4
5

```
    Title(1) = "Team"
    Title(2) = "Score"

    TitleRange.Value = Title
    CellRange.Value = TeamScores
End Sub
```

The values in the array appear in cells in your worksheet.


Chap05-Macros.xlsm - Microsoft Excel
A1
Team
Sheet1
Sheet2
Sheet3
Ready

Team	Score
1	205
2	172
3	289
4	239

Apply It

You can assign the contents of an array to a series of cells in a worksheet by using the `Value` property of the Range object. To learn more about the `Range` object, see Chapter 11. When you create a `Range` object, you can specify the cells you want to include in the range by using the `Set` statement. As the macro runs, VBA places any values you assign to the `Range` object in the corresponding cells in your worksheet.

Example:

```
Dim CellRange As Range
Set CellRange = Range(Cells(2,1), Cells(5,2))
CellRange.Value = TeamScores
```

The `Set` statement assigns the range of cells to the `Range` object. You specify the range by using the `Cells` property to determine the starting and ending cells for the desired range. After you specify the desired range, you assign the contents of an array to the cells in the range by using the `Value` property.

When you use a multidimensional array, all elements of the array must have the same data type. If you plan to use the array to store different types of values, such as strings and numeric values, you must declare your array as variant.

Example:

```
Dim MultiArray (1 To 4, 1 To 5, 1 To 3) As
Variant
```

Convert a List to an Array

By converting a list of values to an array, you can access the individual values quickly using one variable. You can convert a list of values to an array by using a variety of methods.

You can assign values to your array by referencing the index values of each element. Arrays use index values to identify their elements. For example, if an array has ten elements with a lower bound of 1, the third element in the array has an index value of 3. To assign a value to an array, you specify the index values that correspond to the appropriate array element. For example, the following code assigns a value of 45 to the third array element:

`SampleArray(3) = 45.`

With large arrays, assigning values to each element of the array in a statement using the above method can be cumbersome. Using a `For Next` loop is more efficient; you simply create a `For Next` loop to cycle through the entire array. `For Next` loops work best for adding values either from a series of cells or when values are incremental. See Chapter 6 for more information about working with `For Next` loops.

You can use the `Array` function to add a list of values to an array. The `Array` function adds values to the array by starting at the lower bound of the array and then adding values consecutively. For example, the following code adds the values “One”, “Two”, and “Three” to SampleArray:

`SampleArray = Array("One", "Two", "Three").`

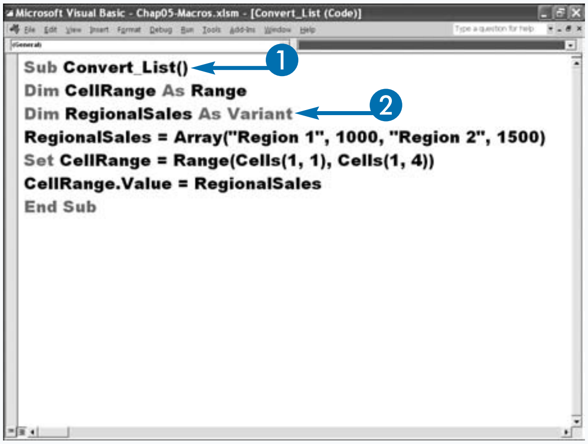
You can produce the same results by specifying each element individually; for example, you can assign a value to the first element of the array, as follows:

`SampleArray(1) = "One".`

Convert a List to an Array

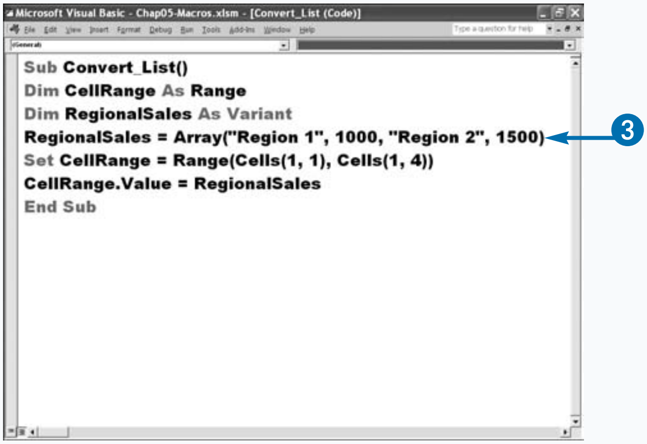
① Name your procedure.

② Declare your array.


Microsoft Visual Basic - Chap05-Macros.xlsm - [Convert_List (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Type a question for help
(General)
1
2

```
Sub Convert_List()
Dim CellRange As Range
Dim RegionalSales As Variant
RegionalSales = Array("Region 1", 1000, "Region 2", 1500)
Set CellRange = Range(Cells(1, 1), Cells(1, 4))
CellRange.Value = RegionalSales
End Sub
```

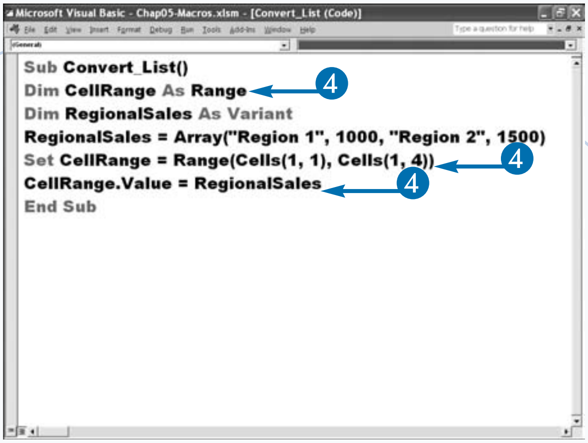
③ Assign values to your array.


Microsoft Visual Basic - Chap05-Macros.xlsm - [Convert_List (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Type a question for help
(General)
3

```
Sub Convert_List()
Dim CellRange As Range
Dim RegionalSales As Variant
RegionalSales = Array("Region 1", 1000, "Region 2", 1500)
Set CellRange = Range(Cells(1, 1), Cells(1, 4))
CellRange.Value = RegionalSales
End Sub
```

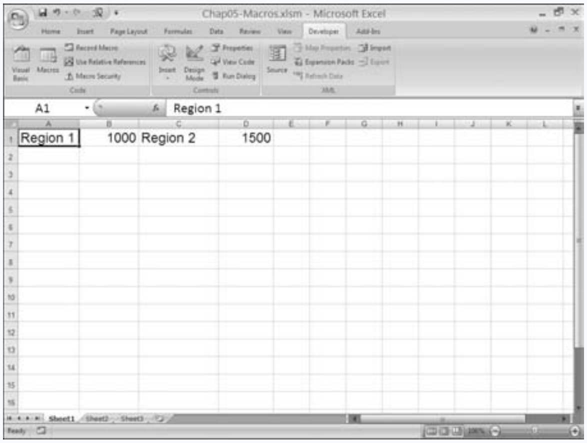
4. Set the Range property.

5. Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap05-Macros.xlsm - [Convert_List (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
4
4
4

```
Sub Convert_List()
Dim CellRange As Range
Dim RegionalSales As Variant
RegionalSales = Array("Region 1", 1000, "Region 2", 1500)
Set CellRange = Range(Cells(1, 1), Cells(1, 4))
CellRange.Value = RegionalSales
End Sub
```

The values in the array appear in cells in your worksheet.


Chap05-Macros.xlsm - Microsoft Excel
Home
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Sheet1
Sheet2
Sheet3
Ready

A1 Region 1

A	B	C	D
Region 1	1000	Region 2	1500

Extra

The Array function uses the variant data type. As a result, you can have different data types in a single array. As shown in the example in this section, you can add both strings and numeric values to the same variable when using the Array function.

You can use the ReDim statement to change the size of the array after you create it. You can also use the Array function more than once in the same procedure to reassign the values in the array. See the section, "Redimension an Array," for more information on resizing an array.

You can use the following code to assign the numbers 1 to 10 to an array. See Chapter 6 for more information on For Next loops.

Example:

```
Sub Assign_Numbers()
Dim X as Integer
Dim RecNo(1 To 10) As
Integer
For X =1 To 10
     RecNo(X) = X
     Cells(X,1) = RecNo(X)
Next
End Sub
```

Redimension an Array

VBA lets you declare two types of arrays: fixed-size and dynamic arrays. When you declare a fixed-size array, you specify the number of elements in the array. For example, the following code creates a fixed-size array with seven elements: `Dim NewArray(1,7) As String`.

If you do not know how large to make the array when you declare it, you can use a dynamic array. A dynamic array does not have a size until you use the `ReDim` statement to change the array size. First, use the `Dim` statement without a size to create a dynamic array — for example: `Dim NewArray() As String`.

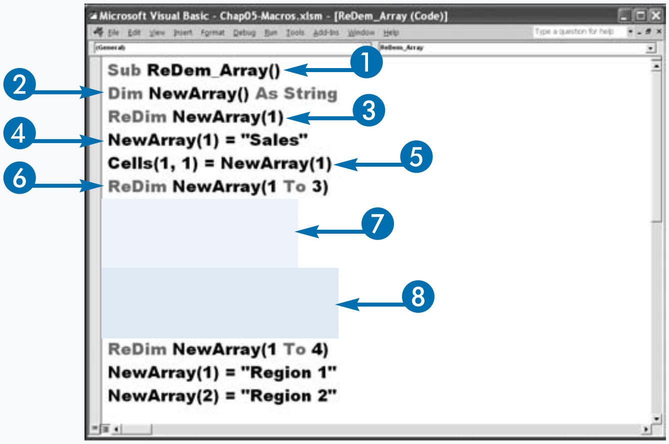
When you are ready to use the array, use the `ReDim` statement to size the array so you can add values. For example, in the code, `ReDim NewArray(1 To 4)`, an array that was initially declared as a dynamic array with an unknown number of elements is redimensioned to contain four elements.

VBA does not allow you to redimension a fixed-size array. If you attempt to change the size of a fixed-size array, you receive an "Array already dimensioned" error message. However, if you declare your array as a dynamic array, you can use the ReDim statement multiple times within a procedure to change the size of the array.

Each time you redimension an array, you destroy the existing elements in the array. If you want to preserve the existing values, use the Preserve statement. For example, the statement, `ReDim Preserve NewArray(7)`, instructs VBA to resize the array to seven elements and maintain any existing values. If the array has four values, those values remain the first four values.

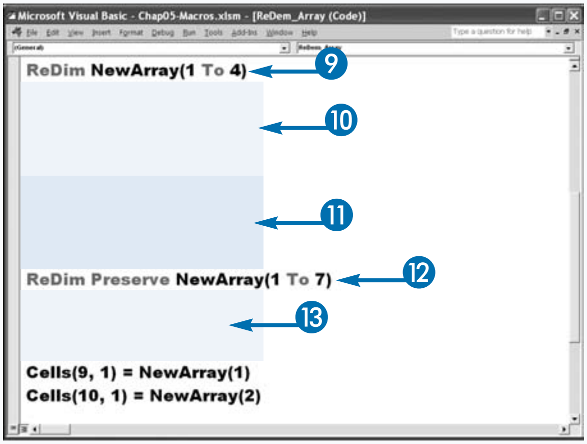
Redimension an Array

1. Name your procedure.
2. Declare a dynamic array.
3. Set the initial dimension size.
4. Assign a value to the variable element.
5. Place the contents of the variable in a cell.
6. Redimension the array.
7. Assign values to the variable elements.
8. Place the contents of the variables in cells.


Microsoft Visual Basic - Chap05-Macros.xlsm - [ReDem_Array (Code)]
1
2
3
4
5
6
7
8

```
Sub ReDem_Array()
Dim NewArray() As String
ReDim NewArray(1)
NewArray(1) = "Sales"
Cells(1, 1) = NewArray(1)
ReDim NewArray(1 To 3)



ReDim NewArray(1 To 4)
NewArray(1) = "Region 1"
NewArray(2) = "Region 2"
```

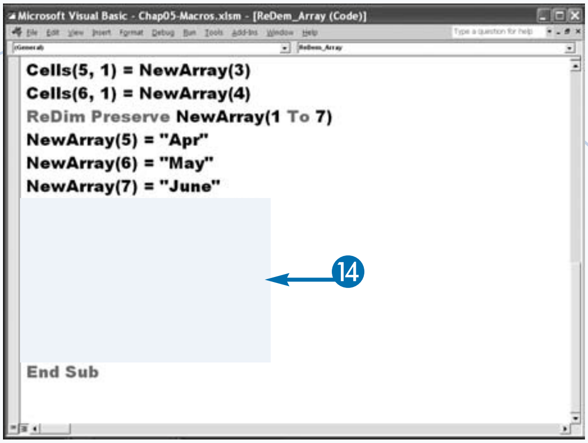
9. Redimension the array.
10. Assign values to the variable elements.
11. Place the contents of the variables into cells.
12. Preserve the first four elements and add space for three more.
13. Assign values to the three new elements.


Microsoft Visual Basic - Chap05-Macros.xlsm - [ReDem_Array (Code)]
9
10
11
12
13

```
ReDim NewArray(1 To 4)



ReDim Preserve NewArray(1 To 7)

Cells(9, 1) = NewArray(1)
Cells(10, 1) = NewArray(2)
```

⑭ Place the values for all of the elements in the worksheet.

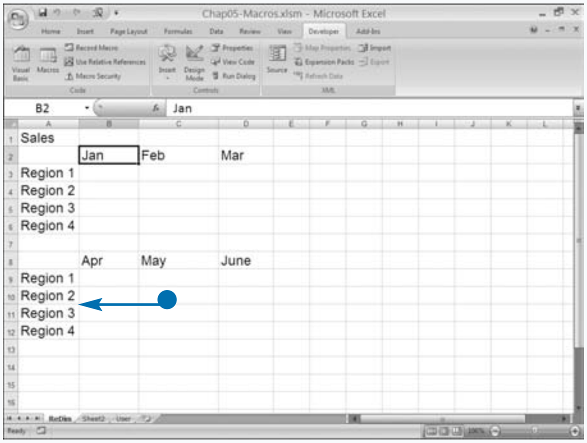
⑮ Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap05-Macros.xlsm - [ReDem_Array (Code)]
(General)
ReDem_Array
14

```
Cells(5, 1) = NewArray(3)
Cells(6, 1) = NewArray(4)
ReDim Preserve NewArray(1 To 7)
NewArray(5) = "Apr"
NewArray(6) = "May"
NewArray(7) = "June"



End Sub
```

The values in the array appear in cells in your worksheet.

- These values were preserved.


Chap05-Macros.xlsm - Microsoft Excel
B2
Jan

	A	B	C	D
1	Sales			
2		Jan	Feb	Mar
3	Region 1			
4	Region 2			
5	Region 3			
6	Region 4			
7				
8		Apr	May	June
9	Region 1			
10	Region 2			
11	Region 3			
12	Region 4			

Extra

To find the upper and lower bounds of an array, VBA provides the UBound and LBound functions. The sample code finds the upper and lower bounds and assigns them to variables.

Example:

```
UpperBound = UBound(NewArray)

LowerBound = LBound(NewArray)
```

Each of these functions returns a Long data type indicating the upper or lower bounds of the specified array. If the array is multidimensional, you must specify the dimension for which you want the bounds.

Example:

```
UpperBounds = UBound(MultiArray, 2)
```

Create a User-Defined Data Type

User-defined data types enable you to create a single variable that records multiple pieces of information. User-defined data types resemble multidimensional arrays in that you can store related values by using one variable name. However, while all elements in the array must contain the same data type, you can create a user-defined data type that contains multiple data types.

You declare user-defined data types at the top of your module in the declarations area. You specify a user-defined data type with the `Type` and `End Type` statements. The `Type` statement indicates the start of the user-defined data type definition, and the `End Type` statement specifies the end. After the `Type` statement, you indicate the name of the new data type; for example, `Type ItemInfo` creates a data type called ItemInfo. To create a user-defined data type to store an item price and description, you can specify a user-defined data type with two components.

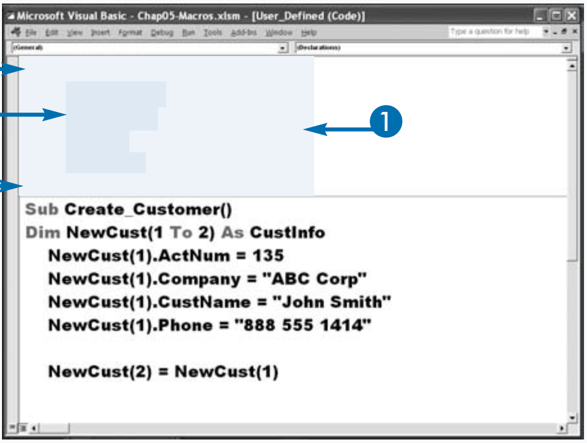
After you create the data type, you can declare variables that use the specified data type. You can use a user-defined data type as the data type for an array. For example, to create an array of the ItemInfo data type, you enter `Dim NewItems(1 To 10) As ItemInfo`.

To assign values to a user-defined array, you not only specify the array element, but you also indicate the component you want to change. For example, this code changes the value of the first component in the array: `NewItems(1).ItemDescription = "15 inch Monitor"`.

Similarly, you can copy the entire contents of one element to another by simply referring to the array element. The following code copies ItemDescription and ItemPrice of the first element of the array to the second array element: `NewItems(2) = NewItems(1)`.

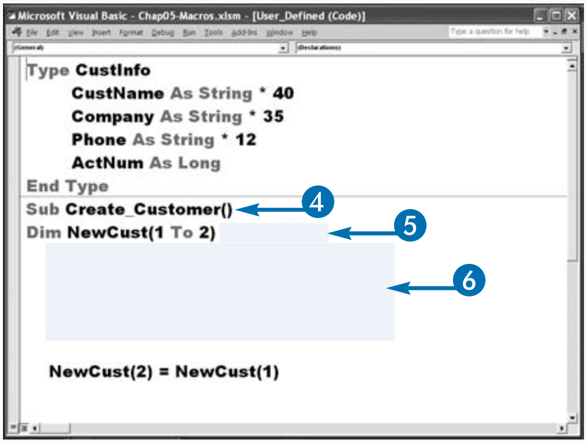
Create a User-Defined Data Type

1. Create your user-defined data type in the declarations area.
2. Add the Type and End Type statements.
3. Declare the components.


Microsoft Visual Basic - Chap05-Macros.xlsm - [User_Defined (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Type a question for help
(General)
(Declarations)
2
3
2
1

```
Sub Create_Customer()
Dim NewCust(1 To 2) As CustInfo
    NewCust(1).ActNum = 135
    NewCust(1).Company = "ABC Corp"
    NewCust(1).CustName = "John Smith"
    NewCust(1).Phone = "888 555 1414"

    NewCust(2) = NewCust(1)
```

4. Create a new procedure.
5. Declare your user-defined data type.
6. Assign values to your user-defined data type.

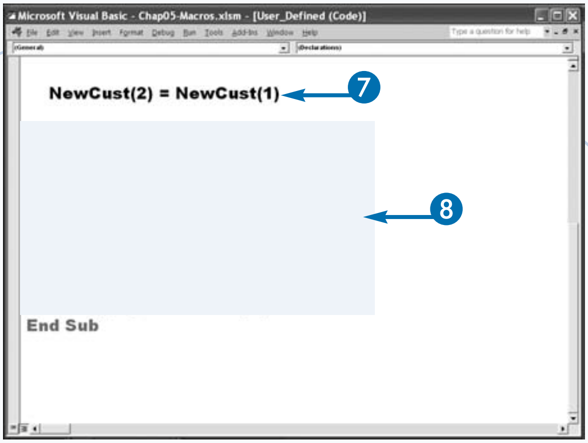

Microsoft Visual Basic - Chap05-Macros.xlsm - [User_Defined (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Type a question for help
(General)
(Declarations)
4
5
6

```
Type CustInfo
        CustName As String * 40
        Company As String * 35
        Phone As String * 12
        ActNum As Long
End Type
Sub Create_Customer()
Dim NewCust(1 To 2)



    NewCust(2) = NewCust(1)
```

7. Copy the contents of one element to another element.

8. Place the contents of both elements in worksheet cells.

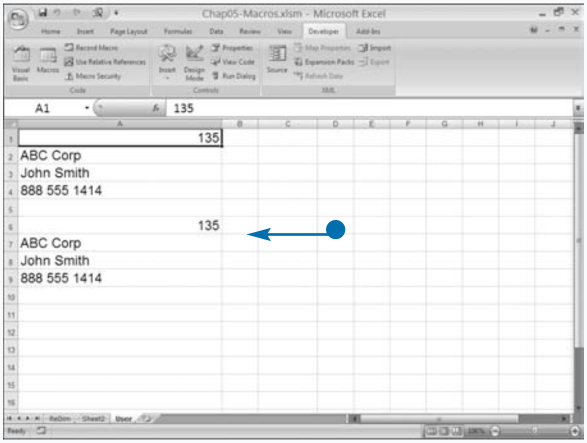
9. Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap05-Macros.xlsm - [User_Defined (Code)]
(General)
(Declarations)
7
8

```
NewCust(2) = NewCust(1)

End Sub
```

The values from the user-defined data type appear in cells in your worksheet.

- VBA copies the values from the first element to the second element.


Chap05-Macros.xlsm - Microsoft Excel
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Add-Ins
A1
User

	A
1	135
2	ABC Corp
3	John Smith
4	888 555 1414
5	
6	135
7	ABC Corp
8	John Smith
9	888 555 1414

Extra

As you use VBA to develop macros, the complexity of your code may make it difficult to keep track of variables. To simplify the process, many developers use a standard naming convention where the variable name reflects the variable type. When using this type of naming convention, you preface each variable name with a standard lowercase prefix that identifies the data type of the variable. For example, you can identify an integer variable by prefixing it with *i* to create the variable name `iNumVisits`. The integer prefix makes it clear at any location in the code that the variable holds an integer value. The following table lists the standard variable-naming conventions for Visual Basic and VBA.

PREFIX	DATA TYPE
b	Boolean
c or cur	Currency
dt	Date/Time
d	Double
i or int	Integer
l or lng	Long
obj	Object
s or sng	Single
str	String
u	User-defined
v or var	Variant

Create Comparisons

Comparison operators enable you to compare two expressions. Comparison expressions always return `True` or `False`. For example, the expression, `A = B`, compares the variable `A` to the variable `B`. It then returns the value `True` if the value stored in variable `A` is equal to the value stored in variable `B`, and `False` if the value stored in variable `A` is not equal to the value stored in variable `B`.

When writing a comparison expression, you use a comparison operator. You place the comparison operator between the expressions you want to compare. Use an equal (=) sign to determine if two values are equal. Use a not equal (`<>`) sign to determine if values are not equal. Use a greater-than (>) sign to determine if one value is greater than another value. Use a less-than (<) sign to determine if one value is less than another value. Use greater than or equal to (>=), to determine if one value is greater than or equal to another value. Use less than or equal to (<=) to determine if one value is less than or equal to another value.

Extra

The following table is a summary of the comparison operators.

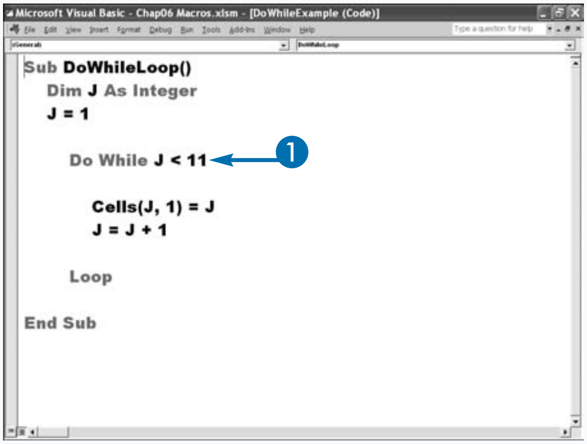
OPERATOR	FUNCTION
=	Equal to
<>	Not equal
>	Greater than
<	Less than
<=	Less than or equal to
>=	Greater than or equal to

Create Comparisons

① Add a comparison operator to your `Do While` loop.

In this example, If J is less than 11, VBA executes the code inside the loop.

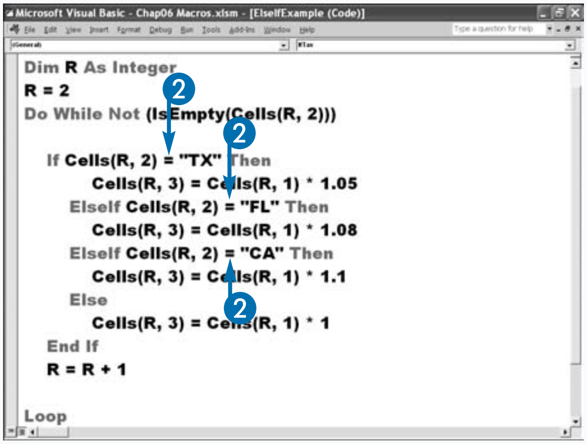
Note: *See the section, "Employ Do While Loops," in this chapter to learn more about* `Do While` *loops.*


Microsoft Visual Basic - Chap06 Macros.xlsm - [DoWhileExample (Code)]
(General)
DoWhileLoop
1

```
Sub DoWhileLoop()
    Dim J As Integer
    J = 1

        Do While J < 11

            Cells(J, 1) = J
            J = J + 1

        Loop

End Sub
```

② Add a comparison operator to your `If` and `ElseIf` statement.

Note: *See the section, "Create If Then Else Statements," in this chapter to learn more about* `If Then` *statements.*


Microsoft Visual Basic - Chap06 Macros.xlsm - [ElseIfExample (Code)]
(General)
IfTax
2
2
2

```
Dim R As Integer
R = 2
Do While Not (IsEmpty(Cells(R, 2)))

    If Cells(R, 2) = "TX" Then
            Cells(R, 3) = Cells(R, 1) * 1.05
        ElseIf Cells(R, 2) = "FL" Then
            Cells(R, 3) = Cells(R, 1) * 1.08
        ElseIf Cells(R, 2) = "CA" Then
            Cells(R, 3) = Cells(R, 1) * 1.1
        Else
            Cells(R, 3) = Cells(R, 1) * 1
    End If
    R = R + 1

Loop
```

Make Use of Logical Operators

When writing VBA code, you can use logical operators to link together comparison expressions to create complex comparison expressions. There are six logical operators: `Or`, `And`, `Xor`, `Eqv`, `Imp`, and `Not`.

Using Logical Or

The logical operator `Or` returns the value `True` if expression A is true or expression B is true.

EXPRESSION A	EXPRESSION B	RESULT
True	True	True
True	False	True
False	True	True
False	False	False

Example:

```
Sub LogicalOr()
Dim Result As Boolean
Result = 10 < 20 Or 30 < 20 'Returns True
MsgBox (Result)
End Sub
```

Using Logical AND

The logical operator `And` returns the value `True` if expression A is true and expression B is true.

EXPRESSION A	EXPRESSION B	RESULT
True	True	True
True	False	False
False	True	False
False	False	False

Using Logical XOR

The logical value `Xor` returns the value `True` if expression A is true and expression B is false, or if expression A is false and expression B is true.

EXPRESSION A	EXPRESSION B	RESULT
True	True	False
True	False	True
False	True	True
False	False	False

Using Logical Eqv

The `Eqv` operator returns the value `True` if expression A is true and expression B is true, or if expression A is false and expression B is false.

EXPRESSION A	EXPRESSION B	RESULT
True	True	True
True	False	False
False	True	False
False	False	True

Using Logical IMP

The `Imp` operator returns `True` unless expression A is true and expression B is false.

EXPRESSION A	EXPRESSION B	RESULT
True	True	True
True	False	False
False	True	True
False	False	True

Using Logical NOT

The `Not` logical operator negates an expression. If the expression would normally return `True`, using a `Not` operator causes it to return `False` and vise versa.

Example:

```
Sub LogicalNot()
Dim Result As Boolean
Result = Not (10 = 10) 'Returns False
MsgBox (Result)
End Sub
```

Employ Do While Loops

You can execute a VBA statement or a series of VBA statements as long as a condition is true by using a `Do While` loop. The following is the syntax for a `Do While` loop:

```
Do [While condition]
     [statements]
Loop
```

A condition is an expression that evaluates to either `True` or `False`. When VBA encounters a `Do While` loop, it evaluates the condition. If the condition is true, it executes the statements. After it executes all of the statements, VBA returns to the `Do While` statement and evaluates the condition again. If the condition is still true, it executes the statements again. If the condition is false, VBA executes the first statement after the `Loop` statement.

A `Do While` loop consists of four basic parts: The `Do` statement initiates the loop. The `While` statement evaluates the condition that must be met. The body of the loop contains a series of statements to perform as long as the condition is true. Finally, the `Loop` statement marks the end of the loop.

You can use the following syntax to create a `Do-Loop While` loop:

```
Do
[statements]
Loop [While condition]
```

A `Do-Loop While` loop is similar to a `Do While` loop. The primary difference is VBA evaluates the condition at the end of the block of statements so the loop always executes at least once.

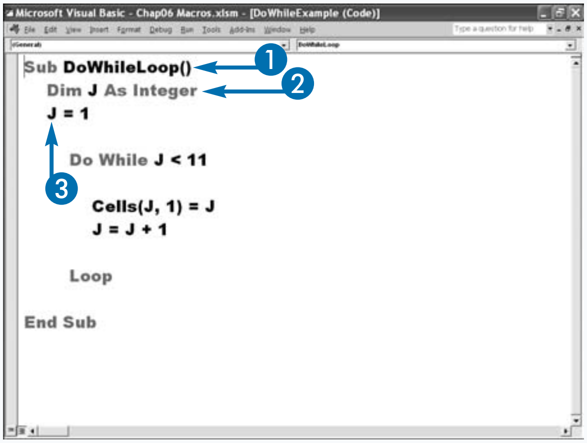
Employ Do While Loops

① Name your procedure.

② Declare your variable.

③ Assign a value to your variable.

This example assigns the number 1 to the variable `J` and uses variable `J` as a counter.


Microsoft Visual Basic - Chap06 Macros.xlsm - [DoWhileExample (Code)]
(General)
DoWhileLoop
1
2
3

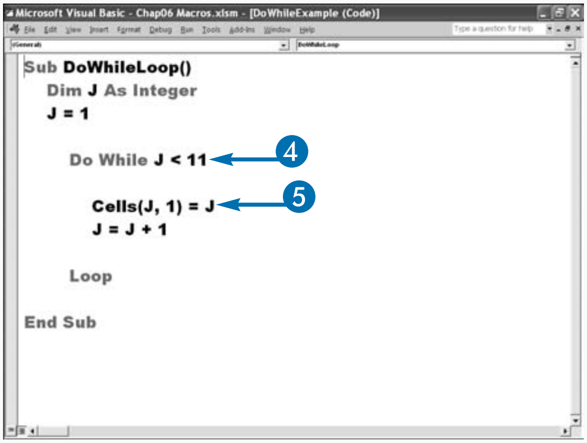
```
Sub DoWhileLoop()
    Dim J As Integer
    J = 1

        Do While J < 11

            Cells(J, 1) = J
            J = J + 1

        Loop

End Sub
```

④ Use a `Do While` statement to evaluate whether a condition is true.

In this example, the code looks at the value assigned to the variable `J` and performs the statements inside the loop if `J` is less than 11.

⑤ Place the value of `J` in the specified cell.

In this example, the cell row is equal to the value of `J` and the cell column is 1.


Microsoft Visual Basic - Chap06 Macros.xlsm - [DoWhileExample (Code)]
(General)
DoWhileLoop
4
5

```
Sub DoWhileLoop()
    Dim J As Integer
    J = 1

        Do While J < 11

            Cells(J, 1) = J
            J = J + 1

        Loop

End Sub
```

6 Increase the value of `J`.

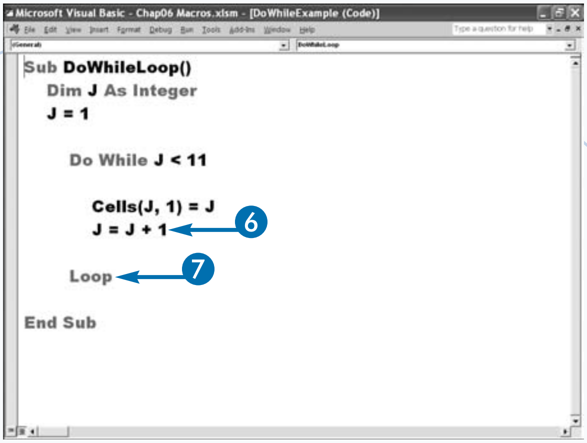
In this example, VBA adds 1 to the current value of `J`.

7 Add the Loop statement.

VBA returns to the `Do While` statement and continues looping until your code no longer meets the condition.

8 Press Alt+F11 to switch from the VBE to Excel, and then run the macro.

Note: *See Chapter 1 to learn how to run a macro.*



Microsoft Visual Basic - Chap06 Macros.xlsm - [DoWhileExample (Code)]

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Add-Ins
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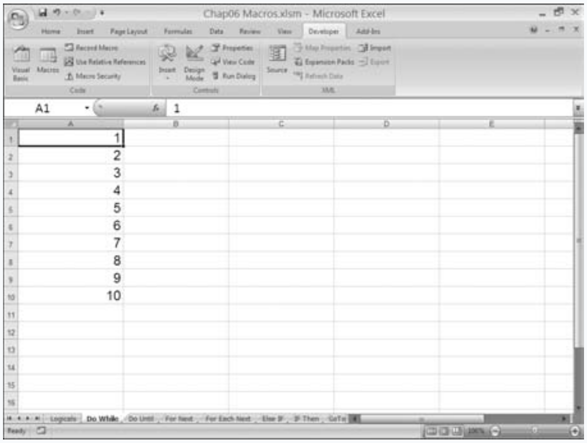
Type a question for help
(General)
DoWhileLoop
6
7

```
Sub DoWhileLoop()
    Dim J As Integer
    J = 1

        Do While J < 11

            Cells(J, 1) = J
            J = J + 1

        Loop

End Sub
```

The macro places the numbers 1 to 10 in column A, rows 1 to 10.



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Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
Logicals
Do While
Do Until
For Next
For Each Next
Else If
If Then
GoTo
Ready

A1 = 1

	A	B	C	D	E
1	1				
2	2				
3	3				
4	4				
5	5				
6	6				
7	7				
8	8				
9	9				
10	10				

Apply It

A loop must contain a statement that changes the condition, and the condition must eventually evaluate to `False`, or the loop will continue endlessly. Programmers refer to this condition as an *infinite loop*.

To avoid an infinite loop, you can use a counter. In the following example, the procedure assigns the counter variable `J` an initial value of 1. The `Do While` loop verifies that it is less than 5, and then executes the loop. The loop assigns a value of 1 to the first cell on the worksheet, cell A1. The counter variable `J` increments by 1 and the loop retests the condition. The looping continues until the condition is false. In this example, the loop repeats four times. When `J` equals 5, the looping stops.

Example:

```
Dim J As Integer
J = 1
Do While J < 5
     ActiveSheet.Rows(J).Cells(1).Value = J
     J = J + 1
Loop
```

Create Do Until Loops

If you need to execute a statement or a series of statements until a condition is met, you can use a `Do Until` loop. For example, you can use a `Do Until` loop to apply changes to a series of cells until you encounter an empty cell.

When you use the `Do Until` loop, the statements you place between the `Do Until` and `Loop` statements execute until the specified condition is met. As soon as the looping structure determines that the condition is true, control moves to the next statement outside the loop.

A `Do Until` loop consists of four basic parts: The `Do` statement initiates the loop. The `Until` condition specifies the condition that must be met. The body of the loop contains a series of statements that execute until the value of the statement meets the condition of the loop. Finally, the `Loop` statement marks the end of the loop.

When the `Until` condition follows the `Do` statement, the `Do Until` loop checks to see if the condition is true before executing. If the condition is not true, the loop executes. If the condition is true, the loop does not execute. When you use this structure for a `Do Until` loop, the code inside the loop may never execute.

You can also place the `Until` condition at the end of the loop. When you place the `Until` condition at the end of the loop, the `Do Until` loop always executes at least once before checking the condition. If the condition is true, the `Do Until` loop stops execution, and control passes to the next VBA statement in your procedure.

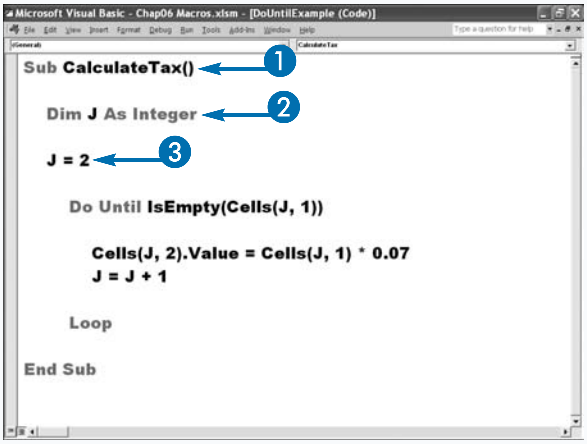
Loop Until a Condition Is Met

① Name your procedure.

② Declare your variable.

③ Assign a value to your variable.

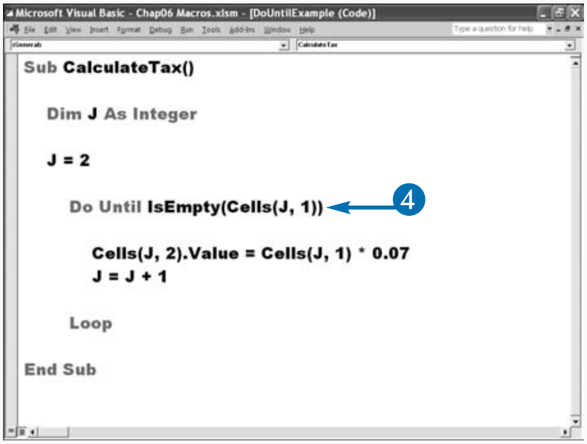
In this example, the variable `J` is used to set the row number.


Microsoft Visual Basic - Chap06 Macros.xlsm - [DoUntilExample (Code)]
(General)
CalculateTax
1
2
3

```
Sub CalculateTax()

  Dim J As Integer

  J = 2

    Do Until IsEmpty(Cells(J, 1))

      Cells(J, 2).Value = Cells(J, 1) * 0.07
      J = J + 1

    Loop

End Sub
```

④ Add your `Do Until` statement.

In this example, the loop continues until it reaches an empty cell.


Microsoft Visual Basic - Chap06 Macros.xlsm - [DoUntilExample (Code)]
(General)
CalculateTax
4

```
Sub CalculateTax()

  Dim J As Integer

  J = 2

    Do Until IsEmpty(Cells(J, 1))

      Cells(J, 2).Value = Cells(J, 1) * 0.07
      J = J + 1

    Loop

End Sub
```

⑤ Type the statements you want to execute.

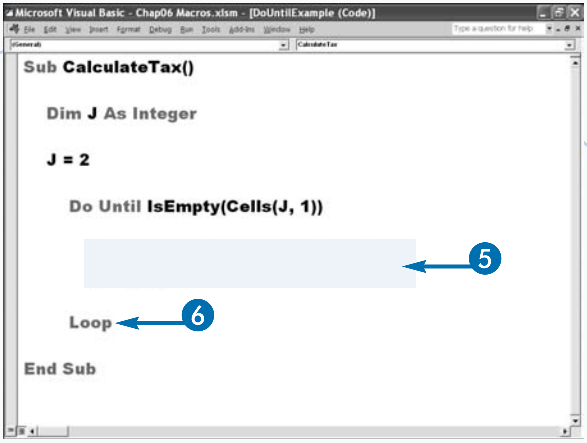
In this example, VBA multiplies the value in column A by 0.07 and places the result in column B.

⑥ Add the Loop statement.

VBA returns to the `Do Until` statement and continues looping until the condition is met.

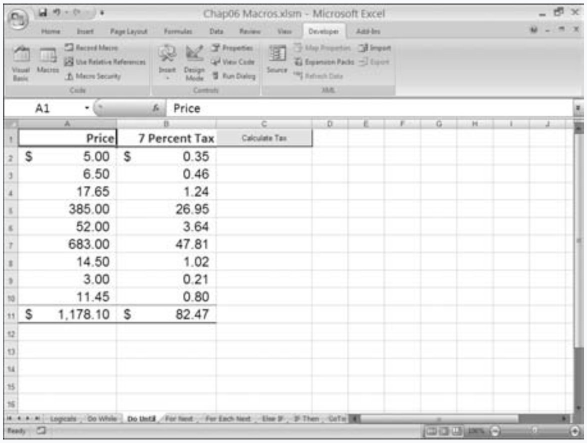
⑦ Press Alt+F11 to switch from the VBE to Excel, and then run the macro.

Note: *See Chapter 1 to learn how to run a macro.*


Microsoft Visual Basic - Chap06 Macros.xlsm - [DoUntilExample (Code)]
(General)
CalculateTax
5
6

```
Sub CalculateTax()

  Dim J As Integer

  J = 2

    Do Until IsEmpty(Cells(J, 1))


    Loop

End Sub
```

The procedure places 7 percent of column A in column B.


Chap06 Macros.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Visual Basic
Macros
Record Macro
Use Relative References
Macro Security
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
XML
Calculate Tax
Logicals
Do While
Do Until
For Next
For Each Next
Else If
If Then
GoTo
Ready

A1 Price

Price	7 Percent Tax
$ 5.00	$ 0.35
6.50	0.46
17.65	1.24
385.00	26.95
52.00	3.64
683.00	47.81
14.50	1.02
3.00	0.21
11.45	0.80
$ 1,178.10	$ 82.47

Extra

When working with loops, you may have situations where you want to jump out of a loop before executing the remaining statements in the loop. You can use an `Exit Do` statement. You can place an `Exit Do` statement anywhere within the body of your loop, and you can have multiple `Exit Do` statements. When VBA encounters an `Exit Do` statement, the control immediately transfers out of the current loop to the next statement outside the loop.

Typically, a conditional statement such as `If Then` appears before the `Exit Do` statement. The conditional statement looks for a condition to meet and then executes the `Exit Do` statement when your code meets the condition.

Example:

```
Do While Condition1 = True
       If Condition2 = True
            Exit Do
       End If
Loop
```

Create For Next Loops

You can use a `For Next` loop to execute a statement or a series of statements a specific number of times. For example, by using a `For Next` loop, you can place text in a specified number of cells.

When you use a `For Next` loop, you must create a counter variable. The statements you place between the `For` and `Next` statements execute until the counter variable exceeds the maximum value. As soon as the looping structure determines that the current value of the counter is greater than the maximum value, control moves to the first statement after the loop.

`For Next` loops consist of three basic parts: The `For` statement initiates the loop. The `For` statement includes a counter variable with an initial and maximum value, such as `x = 1 To 5`. The the body of the loop consists of a series of statements that perform until the counter exceeds the maximum value of the loop. Finally, you mark the end of the loop with the `Next` statement.

When the `For Next` loop starts, it checks to make sure the value of the counter variable does not exceed the maximum value. If the variable is less than or equal to the maximum, the loop executes. The counter variable is a numeric value that increments by default by one each time the loop executes. The loop continues to execute as long as the initial value is less than or equal to the maximum value specified for the counter variable. If the initial value starts out greater than the maximum value, the body of the loop never executes.

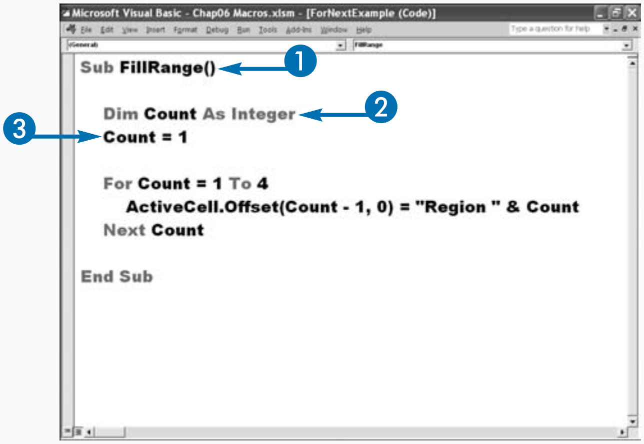
Create For Next Loops

① Name your procedure.

② Declare your variable.

③ Assign a value to your variable.

In this example, the variable Count is a counter.


Microsoft Visual Basic - Chap06 Macros.xlsm - [ForNextExample (Code)]
(General)
FillRange
1
2
3

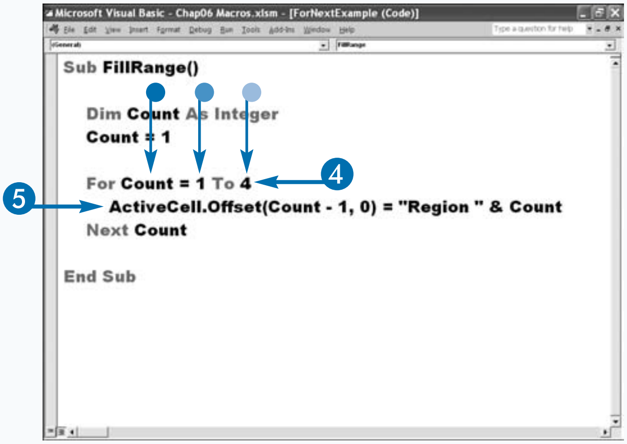
```
Sub FillRange()

    Dim Count As Integer
    Count = 1

    For Count = 1 To 4
        ActiveCell.Offset(Count - 1, 0) = "Region " & Count
    Next Count

End Sub
```

④ Add your `For` statement.

- Counter variable.
- Initial value.
- Maximum value.

⑤ Type the statement you want to execute.

This example places the text Region 1 through Region 4 in four consecutive cells.


Microsoft Visual Basic - Chap06 Macros.xlsm - [ForNextExample (Code)]
(General)
FillRange
4
5

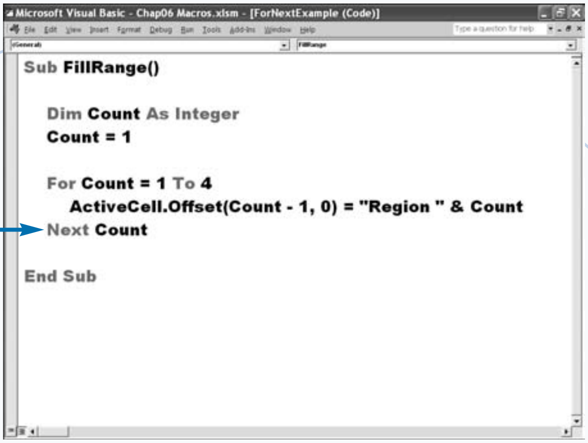
```
Sub FillRange()

    Dim Count As Integer
    Count = 1

    For Count = 1 To 4
        ActiveCell.Offset(Count - 1, 0) = "Region " & Count
    Next Count

End Sub
```

⑥ Add `Next`.

VBA returns to the `For` statements and if the counter exceeds the maximum value, VBA moves to the first line of code after the `Next` statement; otherwise, it executes the statements inside the loop.

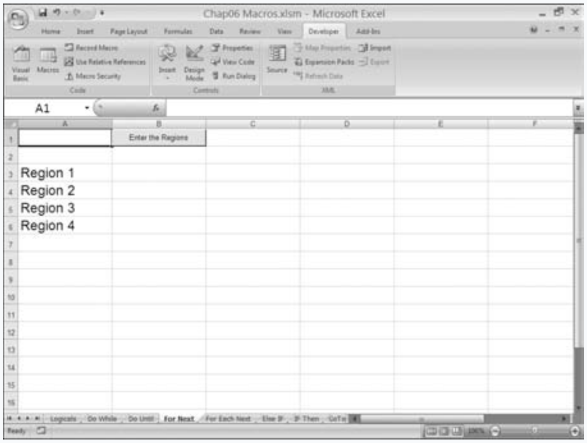
⑦ Press Alt+F11 to switch from the VBE to Excel, and then run the macro.

Note: *See Chapter 1 to learn how to run a macro.*


Microsoft Visual Basic - Chap06 Macros.xlsm - [ForNextExample (Code)]
(General)
FillRange
6

```
Sub FillRange()

    Dim Count As Integer
    Count = 1

    For Count = 1 To 4
        ActiveCell.Offset(Count - 1, 0) = "Region " & Count
    Next Count

End Sub
```

The procedure places the text Region 1 through Region 4 in a column in four consecutive cells.


Chap06 Macros.xlsm - Microsoft Excel
A1
Enter the Regions
Region 1
Region 2
Region 3
Region 4
For Next

Extra

You can use any value to increment your counter variable. By default, the counter variable for a `For Next` loop increments by one each time the loop executes. If you want to increment or decrement the counter variable by a different value, you can use the `Step` statement to specify the increment value. If you specify a positive value, the counter variable increments by that value each time the loop cycles. If you specify a negative value, the counter variable decrements by that value each time the loop cycles. In the following example, the `For` loop starts with an initial counter variable of 2 and a maximum value of 20. Each time the loop cycles, the counter variable increments by two. The `TotalVal` variable increments by the value of the loop. The loop executes ten times. When the initial and maximum values of the counter are equal, the loop executes a final time before it passes control to the next statement after the loop.

Example:

```
For J = 2 To 20 Step 2
     TotalVal = TotalVal + J
Next
```

Execute For Each In Loops

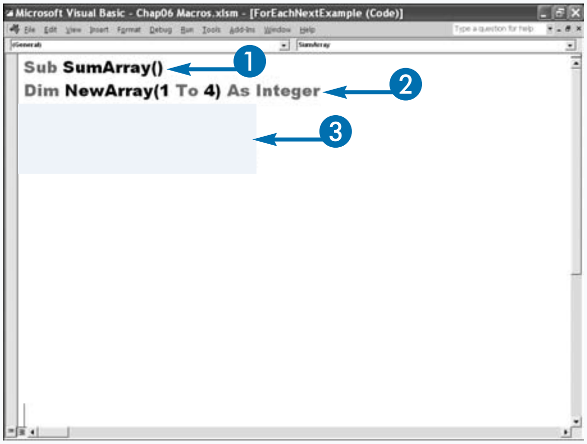
You can use a `For Each In` loop to execute a series of statements for each element in an array or each object in a collection. When you use a `For Each In` loop, the statements you place between the `For` and `Next` statements execute for each element in the array or collection. After the statements execute for the last element, control moves to the next statement outside the loop. The following is the syntax for a `For Each In` loop:

```
For Each element In group

[Statements]

Next [element]
```

A `For Each In` loop consists of three parts. The `For Each` *`element`* `In` *`group`* statement initiates the loop. An element is a variable used to hold an array or collection element as you cycle through the `For Each Next` loop. Group is the name of the array or collection you want to cycle through. The body of the loop contains a series of statements to perform for each element. Finally, the `Next` statement marks the end of the loop.

If you are looping through an array, the variable you use as the element in the `For Each` *`element`* `In` *`group`* statement must be defined as a variant data type. If you are working with a collection, you can define the variable as a variant, generic object, or specific object.

Execute For Each In Loops


Microsoft Visual Basic - Chap06 Macros.xlsm - [ForEachNextExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
SumArray
1
2
3

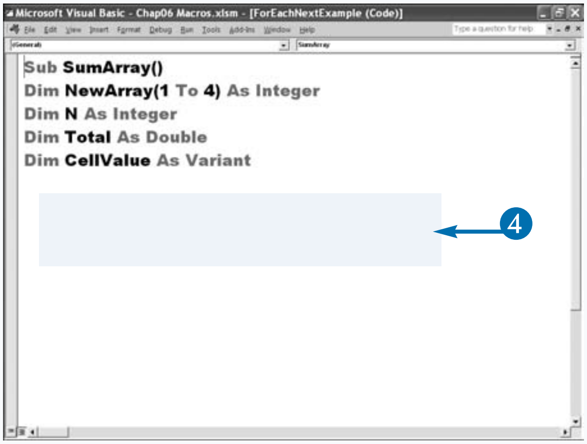
```
Sub SumArray()
Dim NewArray(1 To 4) As Integer
```

① Name your procedure.

② Declare your array.

Note: *See Chapter 5 to learn more about arrays.*

③ Declare your variables.


Microsoft Visual Basic - Chap06 Macros.xlsm - [ForEachNextExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
SumArray
4

```
Sub SumArray()
Dim NewArray(1 To 4) As Integer
Dim N As Integer
Dim Total As Double
Dim CellValue As Variant
```

④ Assign values to your array.

In this example, the value in the active cell and three subsequent cells in the same column are assigned to the array.

⑤ Add your `For Each In` statements.

- Variable that holds each element.
- Array or collection name.
- Statements to execute.

⑥ Add the `Next` statement.

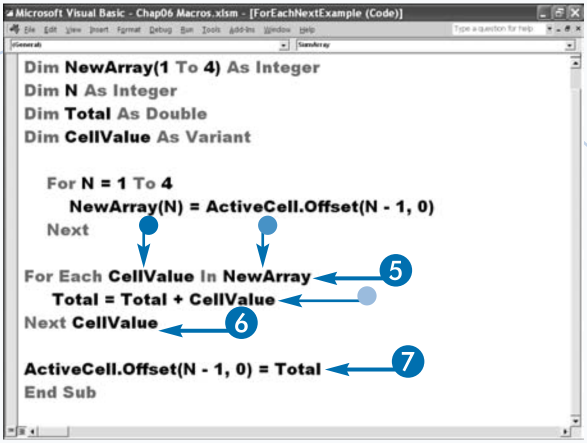
This example totals the elements in the array.

⑦ Type any statements you want to execute after the `For Each In` loop executes.

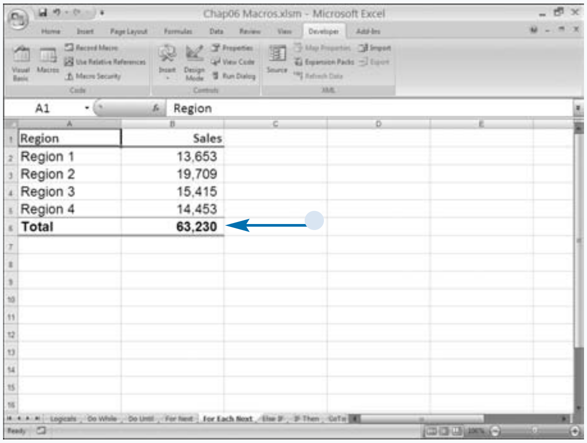
⑧ Press Alt+F11 to switch from the VBE to Excel, and then run the macro.

Note: *See Chapter 1 to learn how to run a macro.*

- In this example, VBA totals the elements in the array and places the total in the cell that follows the array.


Microsoft Visual Basic - Chap06 Macros.xlsm - [ForEachNextExample (Code)]
(General)
SumArray
5
6
7

```
Dim NewArray(1 To 4) As Integer
Dim N As Integer
Dim Total As Double
Dim CellValue As Variant

    For N = 1 To 4
        NewArray(N) = ActiveCell.Offset(N - 1, 0)
    Next

For Each CellValue In NewArray
    Total = Total + CellValue
Next CellValue

ActiveCell.Offset(N - 1, 0) = Total
End Sub
```


Chap06 Macros.xlsm - Microsoft Excel
A1
Logicals
Do While
Do Until
For Next
For Each Next
Else If
If Then
GoTo
Ready

Region	Sales
Region 1	13,653
Region 2	19,709
Region 3	15,415
Region 4	14,453
Total	**63,230**

Apply It

You can nest loops to populate a multidimensional array. When you nest loops, you place one loop inside another loop. To work with a multidimensional array, you create a separate loop for each dimension of the array. The following code uses two nested `For Next` loops to access elements of the array. Notice that the inside loop, with the `L` counter variable, completely cycles each time the loop with `K` runs once. Each `Next` statement has a variable following it. You must exit the inside loop before you can exit outside loops.

TYPE THIS:

```
Sub BuildArray()
Dim NewArray(1 To 3, 1 To 3) As Integer
Dim K As Integer
Dim L As Integer
X = 1
For K = 1 To 3
        For L = 1 To 3
            NewArray(K, L) = X
            X = X + 1
        Next L
 Next K
End Sub
```

RESULT:

The code creates a two-dimensional array with the values shown in the following table:

1	2	3
4	5	6
7	8	9

Create If Then Else Statements

You can conditionally execute a group of statements by using an `If Then Else` statement. For example, you can calculate a bonus of five percent of sales if an employee's sales are greater than $50,000, or enter the text "No Bonus" if an employee's sales are less than or equal to $50,000. The following is the syntax for an `If Then Else` statement:

```
IF condition Then
      [statements]

Else
      [statements]
End If
```

An `If Then Else` statement evaluates a condition. A condition is any expression that evaluates to either `True` or `False`. For example: the expression `If Sales > 50000 Then` evaluates the variable Sales. If the variable Sales is greater than 50,000, the expression returns `True`; otherwise, it returns `False`. If the condition is true, the statements that follow the `Then` statement execute. If the condition is false, the statements that follow the `Else` statement execute. A null condition evaluates to false. An `End If` statement marks the end of an `If Then Else` statement.

If you have multiple conditions that you want to evaluate, you can use `ElseIf`. For example, you can use `ElseIf` when you want to calculate tax at a rate of 5 percent if the state is Texas, 8 percent if the state is Florida, and no tax for all other states. When using `ElseIf`, a single `If Then` statement is followed by several `ElseIf` statements and a final `Else` statement.

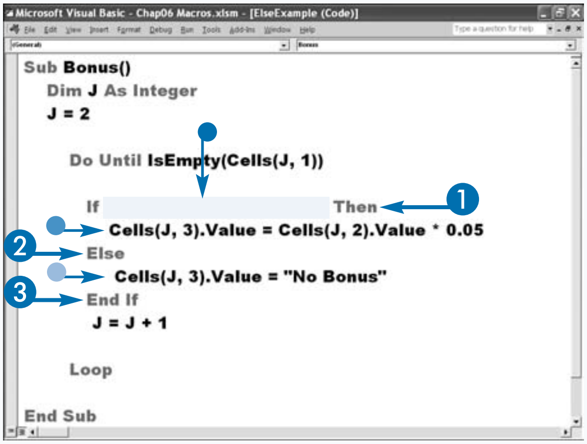
Create If Then Else Statements

IF THEN ELSE

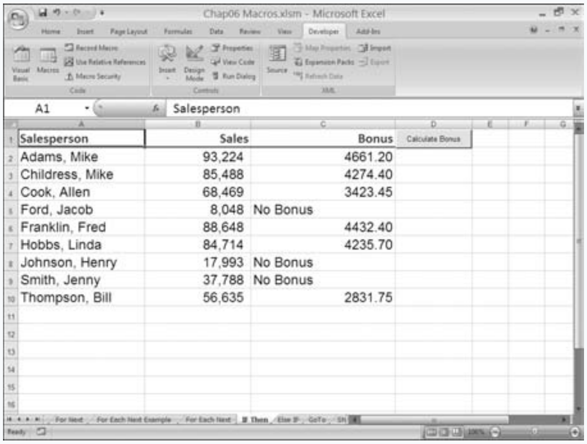
1. Add your `If Then` statement.
   - Condition.
   - Statement to execute.
2. Add your `Else` statement.
   - Statement to execute.
3. Type **End If**.
4. Press Alt+F11 to switch from the VBE to Excel, and then run the macro.

Note: *See Chapter 1 to learn how to run a macro.*

In this example, if the Sales column is over 50,000, VBA calculates a bonus of 4 percent of sales; otherwise, it prints the words "No Bonus."


Microsoft Visual Basic - Chap06 Macros.xlsm - [ElseExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
Bonus
1
2
3

```
Sub Bonus()
    Dim J As Integer
    J = 2

    Do Until IsEmpty(Cells(J, 1))

        If                    Then
            Cells(J, 3).Value = Cells(J, 2).Value * 0.05
        Else
            Cells(J, 3).Value = "No Bonus"
        End If
        J = J + 1

    Loop

End Sub
```


Chap06 Macros.xlsm - Microsoft Excel
Home Insert Page Layout Formulas Data Review View Developer Add-Ins
Visual Basic
Macros
Record Macro
Use Relative References
Macro Security
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
A1
Calculate Bonus

A1 Salesperson

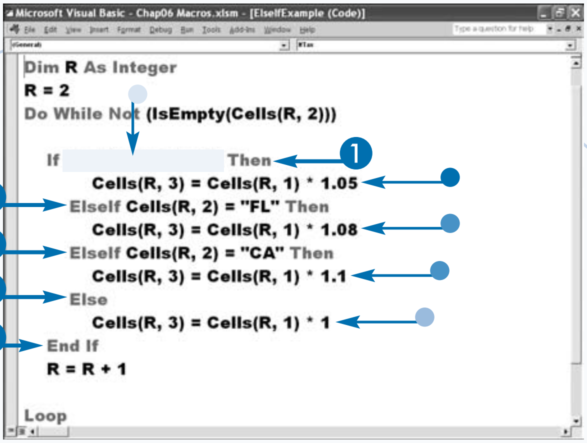
Salesperson	Sales		Bonus
Adams, Mike	93,224		4661.20
Childress, Mike	85,488		4274.40
Cook, Allen	68,469		3423.45
Ford, Jacob	8,048	No Bonus	
Franklin, Fred	88,648		4432.40
Hobbs, Linda	84,714		4235.70
Johnson, Henry	17,993	No Bonus	
Smith, Jenny	37,788	No Bonus	
Thompson, Bill	56,635		2831.75

ELSEIF

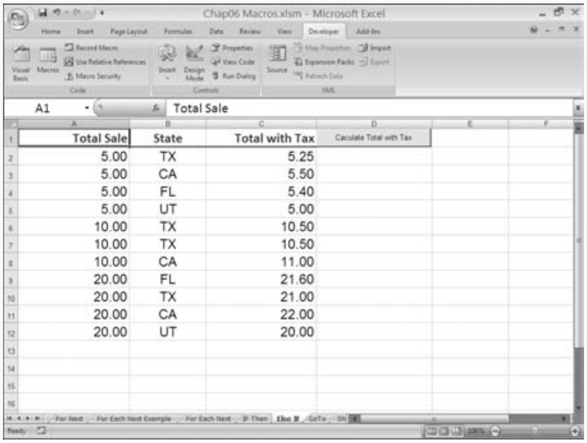
1. Add your `If Then` statement.
   - Condition.
   - Statement to execute.
2. Add your `ElseIf` statements.
   - Statement to execute.
3. Add your `Else` statement.
   - Statement to execute.
4. Type **End If**.
5. Press Alt+F11 to switch from the VBE to Excel, and then run the macro.

Note: *See Chapter 1 to learn how to run a macro.*

In this example, the procedure calculates the sales price plus tax, based on the state tax amount.


Microsoft Visual Basic - Chap06 Macros.xlsm - [ElseIfExample (Code)]
(General)
RTax
1
2
2
3
4

```
Dim R As Integer
R = 2
Do While Not (IsEmpty(Cells(R, 2)))

    If                    Then
        Cells(R, 3) = Cells(R, 1) * 1.05
    ElseIf Cells(R, 2) = "FL" Then
        Cells(R, 3) = Cells(R, 1) * 1.08
    ElseIf Cells(R, 2) = "CA" Then
        Cells(R, 3) = Cells(R, 1) * 1.1
    Else
        Cells(R, 3) = Cells(R, 1) * 1
    End If
    R = R + 1

Loop
```


Chap06 Macros.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
A1
Total Sale

Total Sale	State	Total with Tax	Caculate Total with Tax
5.00	TX	5.25	
5.00	CA	5.50	
5.00	FL	5.40	
5.00	UT	5.00	
10.00	TX	10.50	
10.00	TX	10.50	
10.00	CA	11.00	
20.00	FL	21.60	
20.00	TX	21.00	
20.00	CA	22.00	
20.00	UT	20.00	

Extra

Although VBA does not require you to indent your code, you can use indentation to improve readability. Indenting enables you to analyze the structure of the code without reading each line. When working with conditional statements, such as `If Then` statements and looping statements, most programmers indent the statements that execute. The following example shows how you can indent the code for a `For Next` loop so you can easily locate the loop's beginning and end. The example also indents an `If Then` statement.

Example:

```
For I = 1 To 5
        If J < 10 Then
            J = J + 1
        End If
Next
```

If you have an `If Then` statement that consists of only one statement, you can combine the `If` statement with the `Then` statement and eliminate the `End If` statement.

Example:

```
If Sum < 10 Then Sum = Sum + 1
'This is equivalent to typing the following:
If Sum < 10 Then
    Sum = Sum + 1
End If
```

Construct Select Case Statements

You can execute a specific block of code based on a value by using a `Select Case` statement. Using a `Select Case` statement is similar to using `ElseIf`. You can use `Select Case` when you have different statements to execute and the statements that execute depend upon the value of a cell, variable, number, or string. For example, you can base the calculation of sales tax on the state. You can calculate a tax rate of 5 percent if the state is Texas, 8 percent if the state is Florida, and no tax for all other states. The following is the syntax for `Select Case` statements.

```
Select Case testexpression
[Case expressionlist -n
      [statements-n]]
[Case Else
      [elsestatements]]
End Select
```

The `Select Case` statement identifies the expression against which you want to test each `case` statement. Each `Case` statement contains a value to test and the statements to execute if the `case` statement is true, for example:

```
Select Case UserVal
      Case 4
            Statements
. . .
End Select
```

The example determines whether `UserVal = 4` is `True`. Under each `Case` statement are statements that execute if the expression evaluates to true. The `End Select` statement marks the end of the `Select Case` statement.

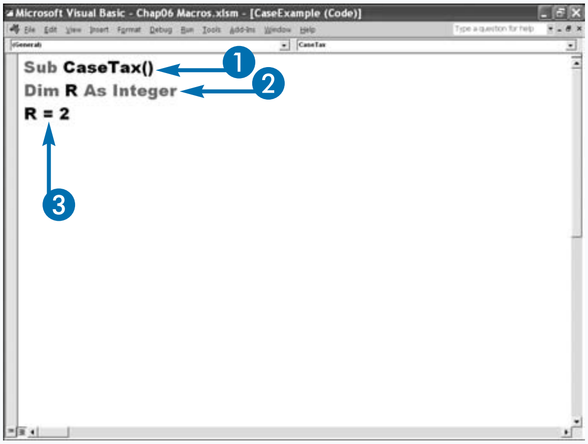
You can also add a `Case Else` statement that supplies the statement to run if none of the `Case` statements evaluate to `true`.

Construct Select Case Statements

① Name your procedure.

② Declare your variable.

③ Initialize your variable.


Microsoft Visual Basic - Chap06 Macros.xlsm - [CaseExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Type a question for help
(General)
CaseTax
1
2
3

```
Sub CaseTax()
Dim R As Integer
R = 2
```

④ Create a `Do While` Loop.

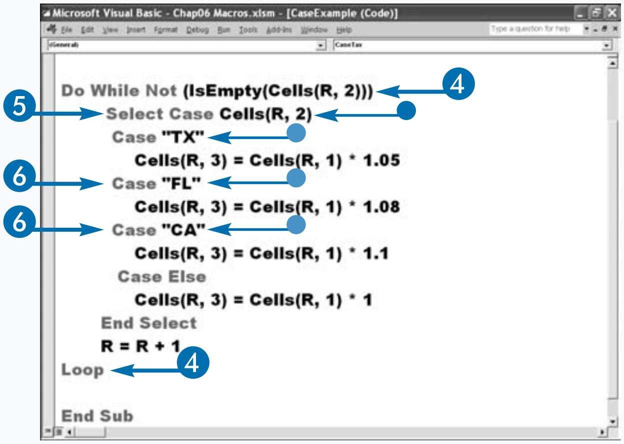
Note: *See the section, "Employ Do While Loops," in this chapter to learn how to create a* `Do While` *Loop.*

⑤ Type your `Select Case` statement.

- Each Case statement value is compared to this value.

⑥ Type your `Case` statements.

- If the value in the `Select Case` statement is equal to the value in the `Case` statement, the statements that follow the `Case` statement execute.


Microsoft Visual Basic - Chap06 Macros.xlsm - [CaseExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Type a question for help
(General)
CaseTax
4
5
6
6
4

```
Do While Not (IsEmpty(Cells(R, 2)))
    Select Case Cells(R, 2)
     Case "TX"
        Cells(R, 3) = Cells(R, 1) * 1.05
     Case "FL"
        Cells(R, 3) = Cells(R, 1) * 1.08
     Case "CA"
        Cells(R, 3) = Cells(R, 1) * 1.1
      Case Else
        Cells(R, 3) = Cells(R, 1) * 1
    End Select
    R = R + 1
Loop

End Sub
```

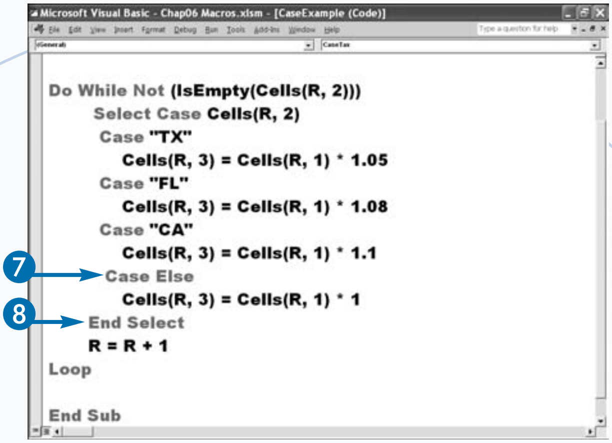
⑦ Add your `Case Else` statement.

The statements after the `Case Else` statement execute if none of the other Case statements match the `Select Case` value.

⑧ Add an `End Select` statement.

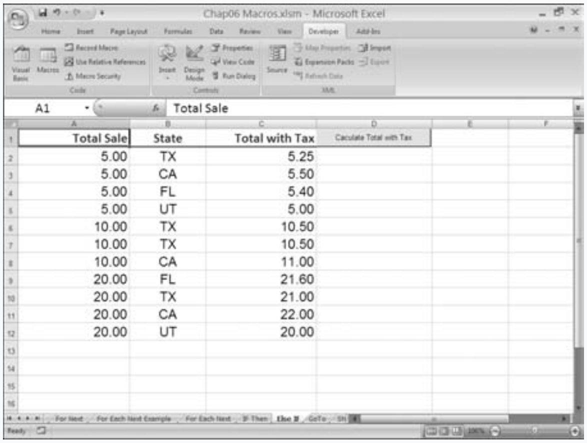
⑨ Press Alt+F11 to switch from the VBE to Excel, and then run the macro.

Note: *See Chapter 1 to learn how to run a macro.*


Microsoft Visual Basic - Chap06 Macros.xlsm - [CaseExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
CaseTax
7
8

```
Do While Not (IsEmpty(Cells(R, 2)))
    Select Case Cells(R, 2)
     Case "TX"
       Cells(R, 3) = Cells(R, 1) * 1.05
     Case "FL"
       Cells(R, 3) = Cells(R, 1) * 1.08
     Case "CA"
       Cells(R, 3) = Cells(R, 1) * 1.1
     Case Else
       Cells(R, 3) = Cells(R, 1) * 1
    End Select
    R = R + 1
Loop

End Sub
```

In this example, the procedure calculates the sales price plus tax, based on the state tax amount.


Chap06 Macros.xlsm - Microsoft Excel
Home Insert Page Layout Formulas Data Review View Developer Add-Ins
Visual Basic
Macros
Record Macro
Use Relative References
Macro Security
Insert
Design Mode
Properties
View Code
Run Dialog
Source
Code
Controls
XML
A1
Calculate Total with Tax
Ready

A1 Total Sale

	A	B	C
1	Total Sale	State	Total with Tax
2	5.00	TX	5.25
3	5.00	CA	5.50
4	5.00	FL	5.40
5	5.00	UT	5.00
6	10.00	TX	10.50
7	10.00	TX	10.50
8	10.00	CA	11.00
9	20.00	FL	21.60
10	20.00	TX	21.00
11	20.00	CA	22.00
12	20.00	UT	20.00

Apply It

With the `Select Case` statement, you can use comparison statements to compare a range of values, or multiple values.

TYPE THIS:

```
Select Case NumSales
      Case 1 To 5
              Commission = Total * .05
      Case 6 To 15
              Commission = Total * .1
End Select
```

RESULT:

The Select Case statement checks the value of NumSales to see whether it falls into one of the two specified ranges.

TYPE THIS:

```
Select Case NumStudents
      Case Is < 10
             MsgBox("Not enough students enrolled")
End Select
```

RESULT:

The Select Case statement displays the message box if the value of NumStudents is less than 10.

TYPE THIS:

```
Select Case State
      Case "TX", "CA"
             Total = Total * 1.085
End Select
```

RESULT:

If the value of State equals TX or CA, the total is calculated using 8.5 percent for the sales tax.

GoTo a Named Location

You can jump to a named location within your macro by using a `GoTo` statement. However, before you can use a `GoTo` statement, you must label the line in your procedure to which you want to move. A label is a text string followed by a colon. The `GoTo` command moves to the label, thereby passing control from the current location in the procedure to the label. The following is the syntax for the `GoTo` command:

```
Goto label
```

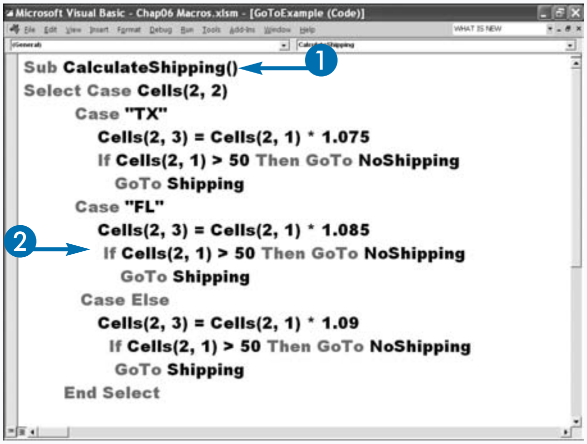
As you can see, there are two parts to a `GoTo` command: the `GoTo` statement and the label. You can place a label anywhere in your procedure. The `GoTo` command can only jump to labels within the same procedure. They cannot jump to a label in another procedure, even if both procedures are in the same module. You can add multiple `GoTo` commands to the same procedure, and each `GoTo` command can jump to the same or different labels.

You should only use `GoTo` commands in situations where you cannot obtain the desired results using conditional statements or looping structures. `GoTo` commands date back to when each line of code had a specific line number and `GoTo` commands jumped to the specified line of code. While `GoTo` commands are often used for trapping errors in VBA, many programmers consider it bad programming to use `GoTo` commands too frequently. See Chapter 8 for more information on using a `GoTo` statement when debugging your code.

GoTo a Named Location

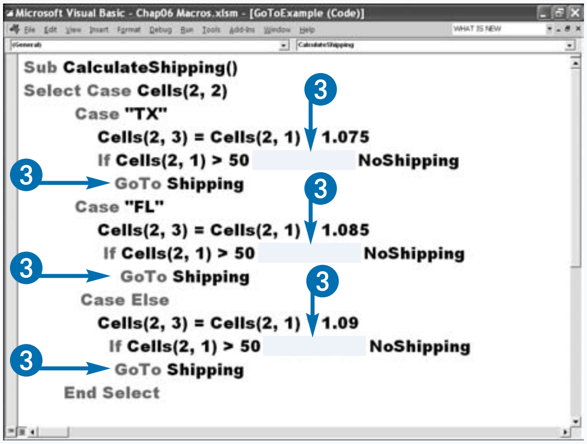
① Create a new procedure.

② Add your code.


Microsoft Visual Basic - Chap06 Macros.xlsm - [GoToExample (Code)]
1
2

```
Sub CalculateShipping()
Select Case Cells(2, 2)
     Case "TX"
        Cells(2, 3) = Cells(2, 1) * 1.075
        If Cells(2, 1) > 50 Then GoTo NoShipping
          GoTo Shipping
     Case "FL"
        Cells(2, 3) = Cells(2, 1) * 1.085
         If Cells(2, 1) > 50 Then GoTo NoShipping
          GoTo Shipping
      Case Else
        Cells(2, 3) = Cells(2, 1) * 1.09
          If Cells(2, 1) > 50 Then GoTo NoShipping
          GoTo Shipping
     End Select
```

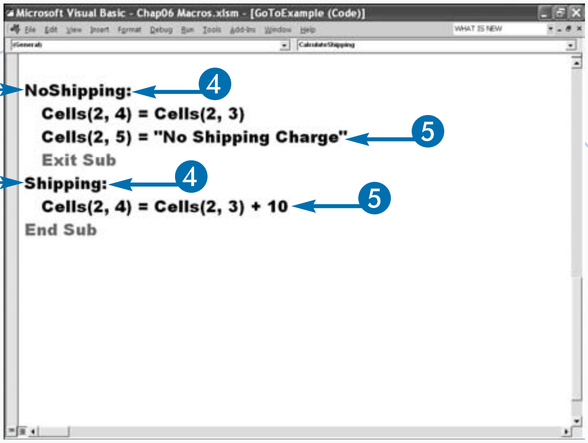
③ Add your `GoTo` statements.


Microsoft Visual Basic - Chap06 Macros.xlsm - [GoToExample (Code)]
3
3
3
3
3
3

```
Sub CalculateShipping()
Select Case Cells(2, 2)
     Case "TX"
        Cells(2, 3) = Cells(2, 1) 1.075
        If Cells(2, 1) > 50           NoShipping
          GoTo Shipping
     Case "FL"
        Cells(2, 3) = Cells(2, 1) 1.085
         If Cells(2, 1) > 50           NoShipping
          GoTo Shipping
      Case Else
        Cells(2, 3) = Cells(2, 1) 1.09
          If Cells(2, 1) > 50           NoShipping
          GoTo Shipping
     End Select
```

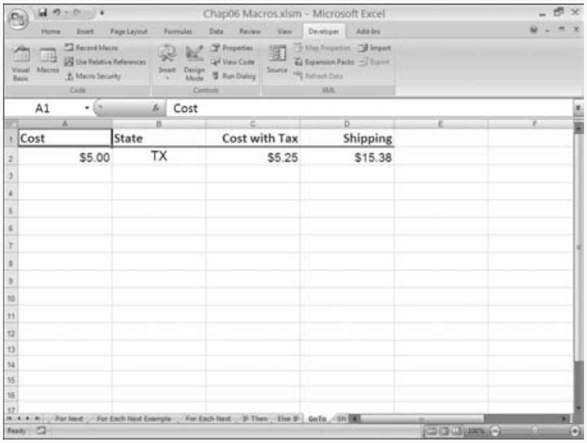
4. Add your `GoTo` label.
   - Label names are followed by a colon.
5. Add any additional code.
6. Press Alt+F11 to switch from the VBE to Excel, and then run the macro.

Note: *See Chapter 1 to learn how to run a macro.*


Microsoft Visual Basic - Chap06 Macros.xlsm - [GoToExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
WHAT IS NEW
(General)
CalculateShipping
4
5
4
5

```
NoShipping:
   Cells(2, 4) = Cells(2, 3)
   Cells(2, 5) = "No Shipping Charge"
   Exit Sub
Shipping:
   Cells(2, 4) = Cells(2, 3) + 10
End Sub
```

In this example, the procedure calculates a shipping charge if the cost with tax is less than $50.00.


Chap06 Macros.xlsm - Microsoft Excel
Home Insert Page Layout Formulas Data Review View Developer Add-Ins
A1
Cost
Ready

Cost	State	Cost with Tax	Shipping
$5.00	TX	$5.25	$15.38

Extra

You place labels in a procedure to mark the location of code. Labeling code does not change how it executes. Code within a loop or conditional statement executes only when the condition is met. Labeled code executes when a `GoTo` statement jumps to it, or when the program reaches that line of code.

If you have multiple areas of labeled code, you may not want it all to execute. To avoid execution of code that follows a labeled section, you can use another `GoTo` statement or an Exit Sub statement to terminate the current procedure.

The following example uses the Exit Sub command before the label procedure to avoid execution of the `T =50` statement. The `GoTo` command jumps to the IncreaseValue label, and the `T = T * 5` statement does not execute.

Example:

```
Sub TestGoTo()
Dim T As Integer
T = Cells(1,1)
If T < 5 Then GoTo IncreaseValue
     T = T * 5
Exit Sub
IncreaseValue:
     T = 50
End Sub
```

Call a Procedure

If you are in one procedure and you want to execute another procedure, you can use a `Call` statement. You simply type the word `Call` followed by the name of the procedure you want to call, as well as any arguments the procedure requires, in parentheses and separated by commas. When you call a procedure, VBA moves to the first line of code in the called procedure and begins processing. After the called procedure completes processing, VBA returns to the next line of code after the call and continues processing the original procedure.

You can conditionally call a procedure by using a conditional VBA statement, such as an `If Then` statement with a `Call` statement. When you combine the `Call` statement with a conditional statement, VBA executes the called procedure only if the specified condition is met. The `If Then` statement checks the specified condition. If the value of the condition is true, the control passes to the called procedure or function and then, upon the called procedure's completion, returns to the original procedure. If you do not want to continue processing the first procedure after calling the second, you can use an `Exit Sub` statement to exit the procedure.

The keyword `Call` is optional when executing a `Call` statement. You can call a procedure simply by typing the procedure name. If you omit the `Call` keyword, do not place your arguments in parentheses. Simply type the procedure name followed by its arguments, separated by commas. You can call Sub procedures, Function procedures, or Dynamic-Link Library (DLL) procedures.

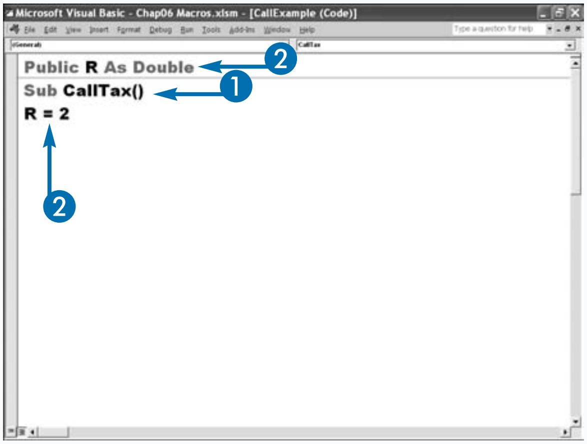
Call a Procedure

① Name your procedure.

② Declare and initialize any variables.

You may need to make your variable public.

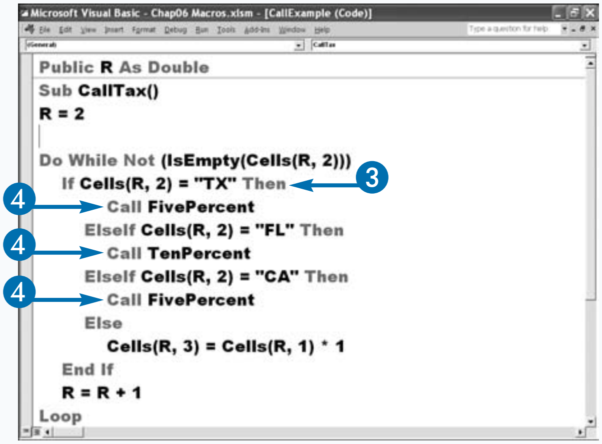
Note: *See Chapter 3 to learn more about public variables.*


Microsoft Visual Basic - Chap06 Macros.xlsm - [CallExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
CallTax
2
1
2

```
Public R As Double
Sub CallTax()
R = 2
```

③ Create an `If Then` condition.

④ Call another procedure.


Microsoft Visual Basic - Chap06 Macros.xlsm - [CallExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
CallTax
3
4
4
4

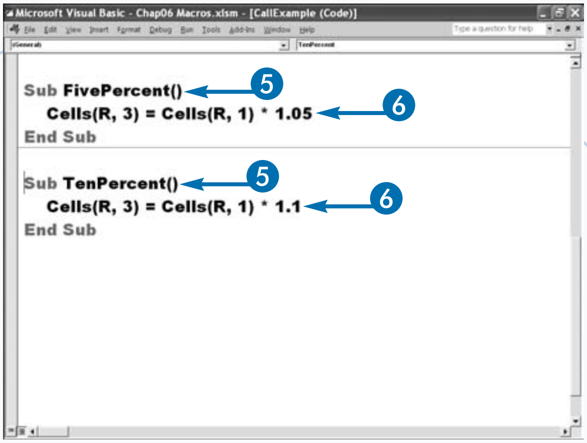
```
Public R As Double
Sub CallTax()
R = 2

Do While Not (IsEmpty(Cells(R, 2)))
  If Cells(R, 2) = "TX" Then
      Call FivePercent
    ElseIf Cells(R, 2) = "FL" Then
      Call TenPercent
    ElseIf Cells(R, 2) = "CA" Then
      Call FivePercent
    Else
      Cells(R, 3) = Cells(R, 1) * 1
  End If
  R = R + 1
Loop
```

⑤ Create called procedures.

⑥ Type code to run when the procedure is called.

⑦ Press Alt+F11 to switch from the VBE to Excel, and then run the macro.

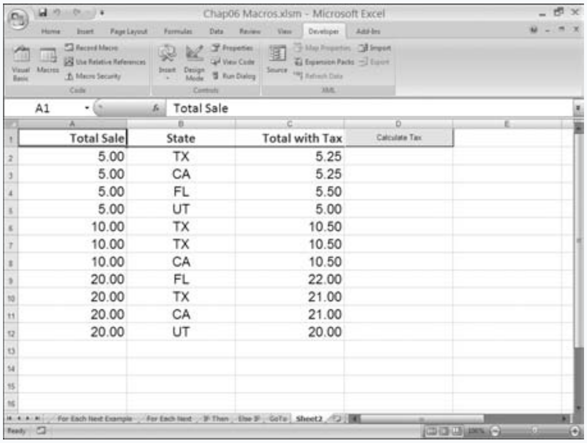
Note: *See Chapter 1 to learn how to run a macro.*



Microsoft Visual Basic - Chap06 Macros.xlsm - [CallExample (Code)]
(General)
TenPercent
5
6
5
6

```
Sub FivePercent()
    Cells(R, 3) = Cells(R, 1) * 1.05
End Sub

Sub TenPercent()
    Cells(R, 3) = Cells(R, 1) * 1.1
End Sub
```

When the condition is met, the `If Then` statement calls the procedure.



Chap06 Macros.xlsm - Microsoft Excel
A1
Total Sale

Total Sale	State	Total with Tax	Calculate Tax
5.00	TX	5.25	
5.00	CA	5.25	
5.00	FL	5.50	
5.00	UT	5.00	
10.00	TX	10.50	
10.00	TX	10.50	
10.00	CA	10.50	
20.00	FL	22.00	
20.00	TX	21.00	
20.00	CA	21.00	
20.00	UT	20.00	

Apply It

You do not need to use the `Call` keyword when you call another procedure or function. However, using the `Call` keyword eliminates confusion by clearly indicating that you are calling a function or `Sub` procedure. When you use the `Call` keyword, you must enclose any arguments passed in parentheses. If you call a procedure without the `Call` keyword, you must omit the parentheses around the argument list, as follows:

THIS CODE:	→	IS EQUIVALENT TO:
`Call NewProc(Var1, Var2).`		`NewProc Var1, Var2.`

Work with Excel Worksheet Functions

A *function* is a block of code that performs a task and returns a single value. There are three types of functions: VBA functions, Excel worksheet functions, and custom functions. A VBA function is a function supplied by VBA. An Excel worksheet function is a formula that Excel has predefined. You can use them to do things such as add numbers, find an average, or find the highest number in a list. Excel provides you with more than 300 worksheet functions. Custom functions work like worksheet function; however, you define the formula the function uses.

Use the `WorksheetFunction` property to place an Excel worksheet function in your VBA procedure. The `WorksheetFunction` property is available through the `Application` object. To access a function in the `WorksheetFunction` object, you type `Application.WorksheetFunction.` followed by the function you want to use and the function arguments enclosed in parentheses. If you want, you can omit `Application.` from the expression. For example, if you want to sum a range of cells and store the result to a variable, both of these expressions are valid:

```
SumVal = Application.WorksheetFunction_
.Sum(Range("A1:A4"))

SumVal = WorksheetFunction.Sum_
(Range("A1:A4"))
```

Generally, you cannot use an Excel worksheet function that has an equivalent VBA function. For example, both VBA and Excel have a `Cos` function that returns a numeric value that represents the cosine of an angle. If you try to use the Excel worksheet function `Cos` in your VBA procedure, you receive an error message.

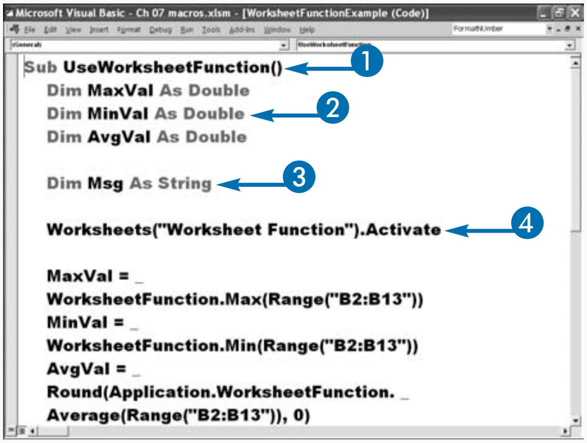
Work with Excel Worksheet Functions

① Name your procedure.

② Declare the variables you want to use to store the results of your worksheet functions.

③ Declare any other variables you will use.

④ Activate the worksheet that uses this procedure by typing `.Activate` after the worksheet reference.

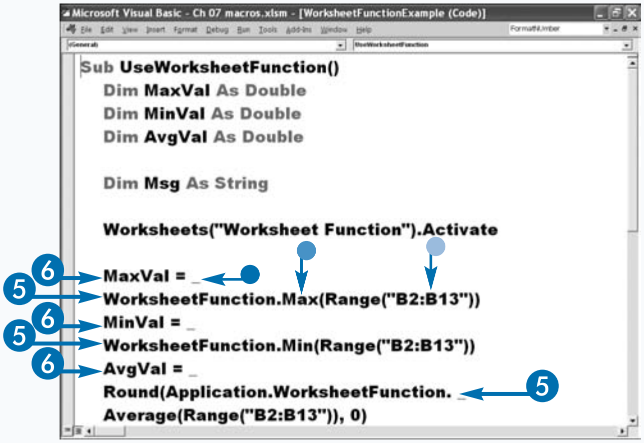

Microsoft Visual Basic - Ch 07 macros.xlsm - [WorksheetFunctionExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
UseWorksheetFunction
1
2
3
4

```
Sub UseWorksheetFunction()
    Dim MaxVal As Double
    Dim MinVal As Double
    Dim AvgVal As Double

    Dim Msg As String

    Worksheets("Worksheet Function").Activate

    MaxVal = _
    WorksheetFunction.Max(Range("B2:B13"))
    MinVal = _
    WorksheetFunction.Min(Range("B2:B13"))
    AvgVal = _
    Round(Application.WorksheetFunction. _
    Average(Range("B2:B13")), 0)
```

⑤ Create your worksheet functions.

- The underscore indicates that the statement is continued on the next line.
- The name of the function.
- Arguments.
- A VBA function.

⑥ Store the result to a variable.


Microsoft Visual Basic - Ch 07 macros.xlsm - [WorksheetFunctionExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
UseWorksheetFunction
6
5
6
5
6
5

```
Sub UseWorksheetFunction()
    Dim MaxVal As Double
    Dim MinVal As Double
    Dim AvgVal As Double

    Dim Msg As String

    Worksheets("Worksheet Function").Activate

    MaxVal = _
    WorksheetFunction.Max(Range("B2:B13"))
    MinVal = _
    WorksheetFunction.Min(Range("B2:B13"))
    AvgVal = _
    Round(Application.WorksheetFunction. _
    Average(Range("B2:B13")), 0)
```

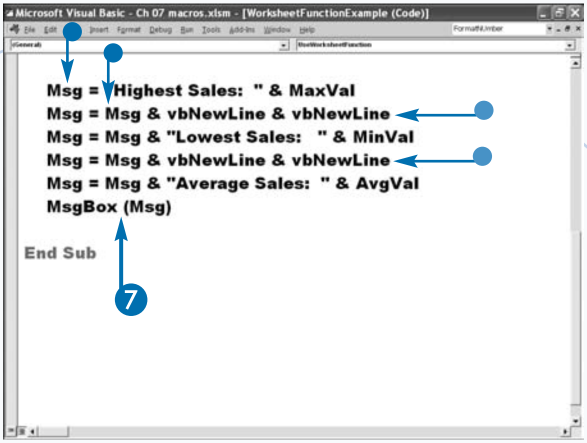
⑦ Use a message box to display the result.

Note: *See the section, "Work with the MsgBox Function," to learn more about message boxes.*

- The variable.
- This codes creates a blank line.

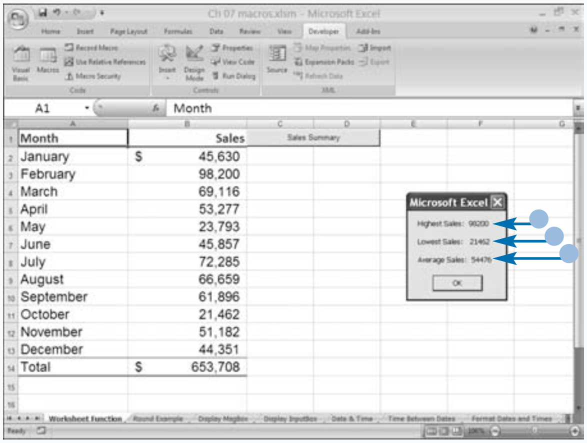
⑧ Press Alt+F11 to switch from the VBE to Excel, and then run the macro.

Note: *See Chapter 1 to learn how to run a macro.*


Microsoft Visual Basic - Ch 07 macros.xlsm - [WorksheetFunctionExample (Code)]
(General)
UseWorksheetFunction
7

```
    Msg = "Highest Sales:  " & MaxVal
    Msg = Msg & vbNewLine & vbNewLine
    Msg = Msg & "Lowest Sales:   " & MinVal
    Msg = Msg & vbNewLine & vbNewLine
    Msg = Msg & "Average Sales:  " & AvgVal
    MsgBox (Msg)

End Sub
```

- The results of the worksheet functions appear in the message box.


Ch 07 macros.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
A1
Month
Worksheet Function
Round Example
Display MsgBox
Display InputBox
Date & Time
Time Between Dates
Format Dates and Times
Ready
Microsoft Excel
OK

Month		Sales	Sales Summary
January	$	45,630	
February		98,200	
March		69,116	
April		53,277	
May		23,793	
June		45,857	
July		72,285	
August		66,659	
September		61,896	
October		21,462	
November		51,182	
December		44,351	
Total	$	653,708	

Highest Sales: 98200

Lowest Sales: 21462

Average Sales: 54476

Extra

The Object Browser lists the functions that are part of the `WorksheetFunction` object. You can view this list using `WorksheetFunction` as the search criterion in the Object Browser. Press F2 to open the Object Browser. See Chapter 4 for more information on the Object Browser.

If a VBA statement does not fit on a single line, you can use the underscore (_) character to tell Excel you want to continue the statement on another line. The example in this section uses the underscore character as a continue statement indicator.

The remainder of this chapter discusses and illustrates VBA functions. The `Round` function used in the following example is a VBA function. The `Round` function takes two arguments: an expression and the number of decimal places to which you want to round the number. If you do not specify the number of decimal places, the `Round` function rounds to an integer.

Example:

```
Result = Round(124.4589, 2) returns 124.46
```

You can also use the Excel worksheet function `ROUND` when writing a VBA procedure.

Work with a MsgBox Function

The `MsgBox` function is a VBA function that makes writing code easier. See Chapter 3 to learn more about functions. You can use the `MsgBox` function to display a dialog box that provides information to the user and, if you want, returns a value to VBA that represents the user's response. The `MsgBox` function has a preset list of values it can return. For example, you can use the `MsgBox` function to prompt the user for a Yes or No response; VBA returns 6 if the user clicks Yes and 7 if the user clicks No.

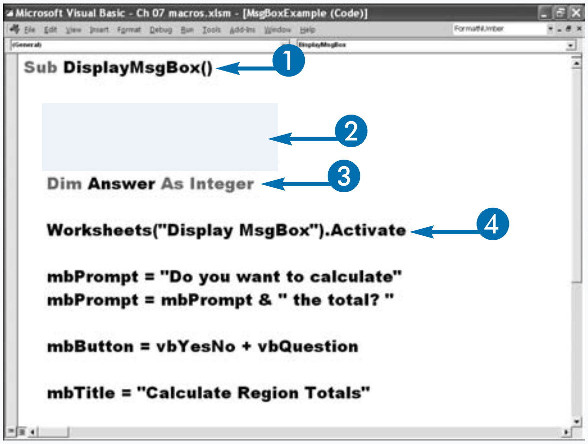
When using the `MsgBox` function, you use arguments to designate the prompts, buttons, and title that appear in your message box. The `Button` and `Title` arguments are optional. Use the `Prompt` argument to specify the text that displays in the message box. You can use a text string enclosed in quotes or you can use a variable. You can combine strings and variables by using the concatenation operator (&), as in this example: `MsgBox("Total Sum: " & TotalSum).`

Use the `Buttons` argument to specify a constant that indicates the buttons and icons that display in the message box. If you do not specify a button constant, the `MsgBox` function uses the default `vbOKOnly` and only displays the OK button. Use the `Title` argument to display the title that appears on the title bar of the message box. If you omit this argument, Excel displays the default title, Microsoft Excel.

Work with a MsgBox Function

1. Name your procedure.
2. Declare the variables you want to use as arguments in the `MsgBox` function.

   Alternatively, you can type the arguments directly into the `MsgBox` function.
3. Declare the variable you want to use to store the value returned by the `MsgBox` function.
4. Activate the worksheet that uses this procedure by typing `.Activate` after the worksheet reference.



Microsoft Visual Basic - Ch 07 macros.xlsm - [MsgBoxExample (Code)]

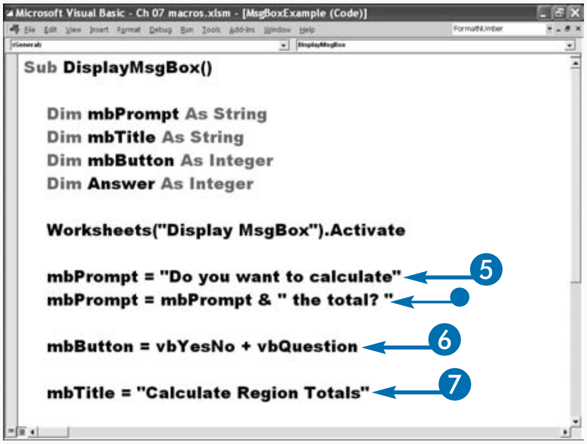
```
Sub DisplayMsgBox()



    Dim Answer As Integer

    Worksheets("Display MsgBox").Activate

    mbPrompt = "Do you want to calculate"
    mbPrompt = mbPrompt & " the total? "

    mbButton = vbYesNo + vbQuestion

    mbTitle = "Calculate Region Totals"
```

5. Store your message to a variable.

- This line of code concatenates the text stored in the mbPrompt variable with additional text.

6. Store the values that represent the buttons you want to use to a variable.

   Place a plus sign between each button you want represented.
7. Store the title you want your message box to have to a variable.



Microsoft Visual Basic - Ch 07 macros.xlsm - [MsgBoxExample (Code)]

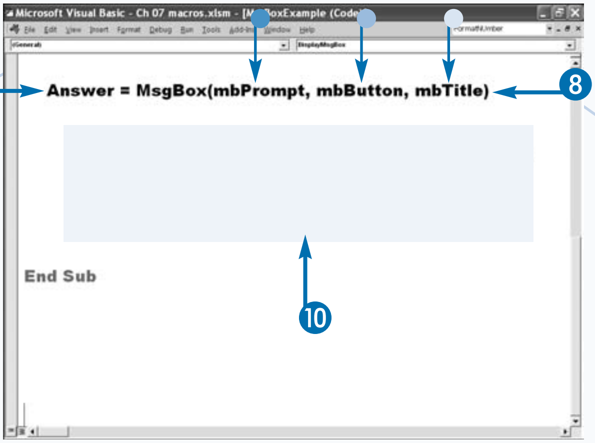
```
Sub DisplayMsgBox()

    Dim mbPrompt As String
    Dim mbTitle As String
    Dim mbButton As Integer
    Dim Answer As Integer

    Worksheets("Display MsgBox").Activate

    mbPrompt = "Do you want to calculate"
    mbPrompt = mbPrompt & " the total? "

    mbButton = vbYesNo + vbQuestion

    mbTitle = "Calculate Region Totals"
```

8. Create the `MsgBox` function.
   - Your message.
   - The buttons you want to display.
   - The title.
9. Assign the value returned by the message box to a variable.
10. Write code to execute an action based on the value returned by the message box.
11. Press Alt+F11 to switch from the VBE to Excel, and then run the macro.

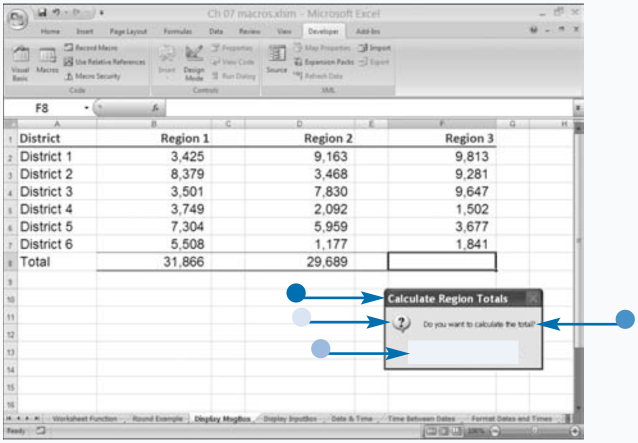
***Note:** See Chapter 1 to learn how to run a macro.*

The message box displays when you run the macro.

- The title.
- The prompt.
- The vbYesNo buttons.
- The vbQuestion button.


Microsoft Visual Basic - Ch 07 macros.xlsm
9
8
10

```
Answer = MsgBox(mbPrompt, mbButton, mbTitle)

End Sub
```


Ch 07 macros.xlsm - Microsoft Excel
F8
Worksheet Function
Round Example
Display MsgBox
Display InputBox
Date & Time
Time Between Dates
Format Dates and Times
Ready

District	Region 1	Region 2	Region 3
District 1	3,425	9,163	9,813
District 2	8,379	3,468	9,281
District 3	3,501	7,830	9,647
District 4	3,749	2,092	1,502
District 5	7,304	5,959	3,677
District 6	5,508	1,177	1,841
Total	31,866	29,689	

Calculate Region Totals

Do you want to calculate the total?

Extra

You can use 20 different constant values as the `Buttons` value for the `MsgBox` function. You can use these values separately, or combine them by placing a plus (+) sign between each constant value. The following code creates a message box containing Yes, No, and Cancel buttons, as well as the Question icon.

Example:

```
Response = MsgBox("Select button.", vbYesNoCancel + vbQuestion)
```

The `MsgBox` function returns an integer value between 1 and 7, which represents the button the user clicked. You can interpret the value the `MsgBox` function returns by looking at the integer value. The following table shows the integer values returned by the `MsgBox` function and their associated constant values.

MSGBOX RETURN	VALUE	CONSTANT	DESCRIPTION
1	`vbOK`	OK button clicked	
2	`vbCancel`	Cancel button clicked	
3	`vbAbort`	Abort button clicked	
4	`vbRetry`	Retry button clicked	
5	`vbIgnore`	Ignore button clicked	
6	`vbYes`	Yes button clicked	
7	`vbNo`	No button clicked	

Using the InputBox Function

Like `MsgBox`, the `InputBox` function is a VBA function. You can use the `InputBox` function to prompt the user for information during the execution of a procedure. The `InputBox` function displays a dialog box that requests information from the user and returns the user response to your procedure. You capture the user response by assigning the results of the `InputBox` function to a variable. The following is the syntax for the `InputBox` function:

```
InputBox(Prompt[,Title][,Default] [,xPos]
[,yPos])
```

Use the prompt argument to specify the text that displays in the input box. You can combine strings and variables by using the concatenation operator (&). The `Title` argument is optional. You can use it to specify the title of your input dialog box. You can use either a text string enclosed in quotes or a variable. If you omit the `Title` argument, Excel displays the default title, Microsoft Excel.

The `Default` argument is optional. You can use it to specify the default value that displays when your text box appears. You can specify the display position of the dialog box by using the optional `xPos` and `yPos` arguments. If you omit these arguments, the dialog box displays in the center of the screen. These arguments use units of measurement called *twips*. One twip equals 1/20 of a point, or 1/1,440 of an inch. The `xPos` argument indicates the distance from the left side of the screen to the left side of the dialog box. The `yPos` argument indicates the position from the top of the screen to the top of the dialog box.

Using the InputBox Function

① Name your procedure.

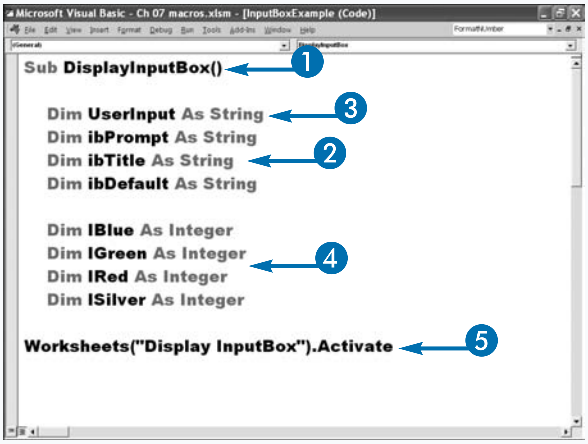
② Declare the variables you want to use as arguments in the `InputBox` function.

Alternatively, you can type the arguments directly into the `InputBox` function.

③ Declare the variable you want to use to store the value returned by the `InputBox` function.

④ Declare any other variables you will need.

⑤ Activate the worksheet that uses this procedure by typing `.Activate` after the workbook reference.


Microsoft Visual Basic - Ch 07 macros.xlsm - [InputBoxExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
DisplayInputBox
1
3
2
4
5

```
Sub DisplayInputBox()

    Dim UserInput As String
    Dim ibPrompt As String
    Dim ibTitle As String
    Dim ibDefault As String

    Dim lBlue As Integer
    Dim lGreen As Integer
    Dim lRed As Integer
    Dim lSilver As Integer

Worksheets("Display InputBox").Activate
```

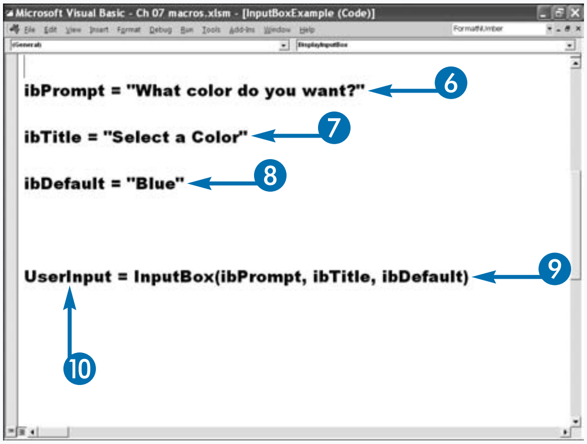
⑥ Store your prompt to a variable.

⑦ Store the title you want your message box to have to a variable.

⑧ Store the default value you want your input box to display to a variable.

⑨ Create your `InputBox` function.

⑩ Assign the value returned by the `InputBox` function to a variable.


Microsoft Visual Basic - Ch 07 macros.xlsm - [InputBoxExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
DisplayInputBox
6
7
8
9
10

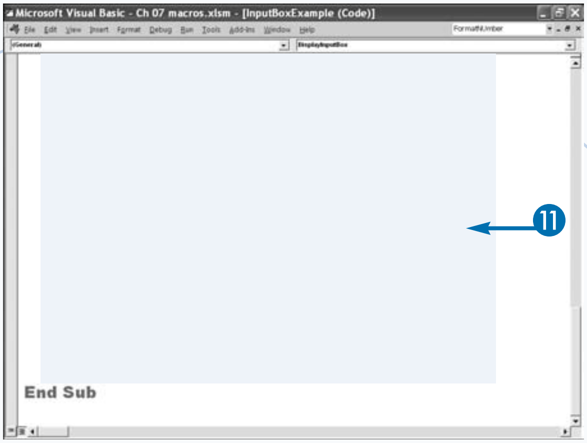
```
ibPrompt = "What color do you want?"

ibTitle = "Select a Color"

ibDefault = "Blue"


UserInput = InputBox(ibPrompt, ibTitle, ibDefault)
```

⑪ Write code that executes based on the value returned by the input box.

Note: *See Chapter 6 to learn more about If Then Else statements.*

⑫ Press Alt+F11 to switch from the VBE to Excel, and then run the macro.

Note: *See Chapter 1 to learn how to run a macro.*

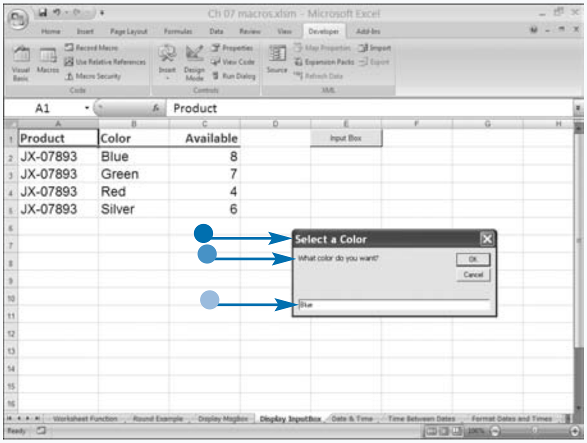


Microsoft Visual Basic - Ch 07 macros.xlsm - [InputBoxExample (Code)]

```
End Sub
```

The input box displays when you run the macro.

- The title.
- The prompt.
- The default value.



Ch 07 macros.xlsm - Microsoft Excel

	A	B	C
1	Product	Color	Available
2	JX-07893	Blue	8
3	JX-07893	Green	7
4	JX-07893	Red	4
5	JX-07893	Silver	6

Select a Color

What color do you want?

Blue

Extra

You can use named arguments to simplify your functions. Many VBA functions have optional arguments. For example, although the `InputBox` function has several arguments, only the first one is required. If you want to include additional arguments, you specify the argument values in order, leaving a space between two commas as a placeholder for any arguments you do not want to use.

Example:

```
UserInput = InputBox("Type a value:", ,"5")
```

Instead of specifying a placeholder for each value, you can use named arguments with the VBA functions. When using a named argument, you specify the name of the argument along with the corresponding value. You type the name of the argument followed by a colon, an equal sign, and the value of that particular argument. You can place named arguments in any order, and you do not have to specify a value for every argument.

Example:

```
UserInput = InputBox(Prompt:="Type a value:", Default:="5")
```

Retrieve the Current Date and Time

VBA includes several date-related, built-in functions that you can add to the procedures and functions you create. You can use these functions to return a system date and/or time, perform date calculations, set a date, or even time a process.

If you want to display the current date or time, you can select from three different functions. The `DATE` VBA function returns the current system date, the `TIME` VBA function returns the current system time, and the `NOW` VBA function returns both the date and time. VBA formats the date and time information in your system's short date format. You can modify the date and time formats by using the Control Panel.

When working with dates, you can avoid displaying a date outside of range by remembering the date range that Excel accepts. VBA accommodates a much larger date range than Excel. It accepts dates between January 1, 0100, and December 31, 9999. Excel accepts dates between January 1, 1900, and December 31, 9999. If you use Excel on a Macintosh, the date range is even smaller. The acceptable date range is January 2, 1904 to December 31, 9999. If you need to display a date outside the range, you can do so by placing the date in a string variable.

You can assign the results of the Date or Time function to a variable, a worksheet cell, or another function. The following example stores the `Now` function to a message box:

```
MsgBox("Current Date and Time: " & Now())
```

Retrieve the Current Date and Time

RETRIEVE THE CURRENT DATE

① Name your procedure.

② Type the Date function.

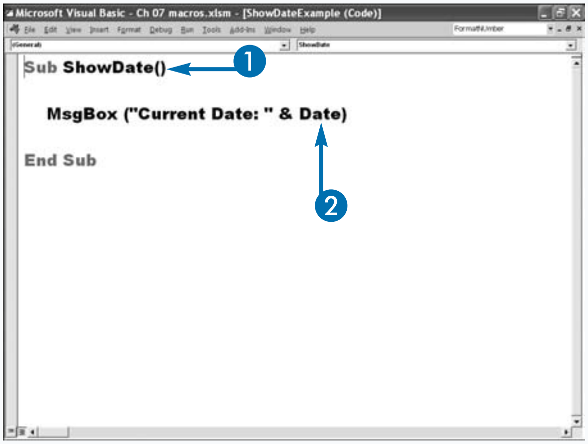
In this example, the Date function is part of the prompt argument for the `MsgBox` function.

Note: *See the section, "Work with a MsgBox Function," in this chapter to learn more about the* `MsgBox` *function.*

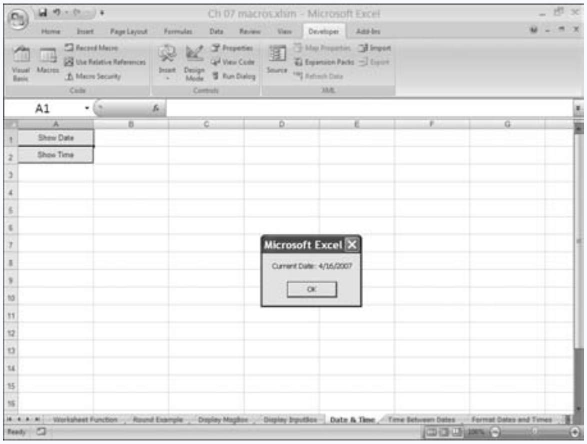
③ Press Alt+F11 to switch from the VBE to Excel, and then run the macro.

Note: *See Chapter 1 to learn how to run a macro.*

The current system date displays in the message box.


Microsoft Visual Basic - Ch 07 macros.xlsm - [ShowDateExample (Code)]
(General)
ShowDate
1
2

```
Sub ShowDate()

    MsgBox ("Current Date: " & Date)

End Sub
```


Ch 07 macros.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
A1
Show Date
Show Time
Microsoft Excel
OK
Date & Time

Current Date: 4/16/2007

RETRIEVE THE CURRENT TIME

1. Name your procedure.

2. Type the `Time` function.

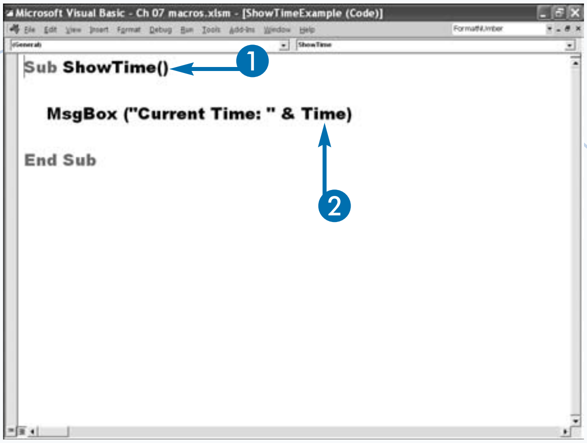
   In this example, the `Time` function is part of the prompt argument for the `MsgBox` function.

***Note:** See the section, "Work with a MsgBox Function," in this chapter to learn more about the `MsgBox` function.*

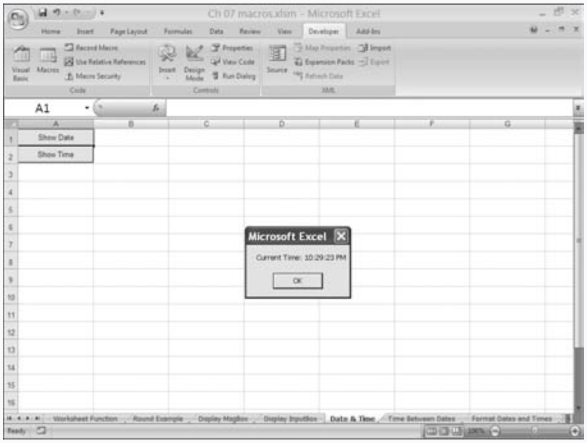
3. Press Alt+F11 to switch from the VBE to Excel, and then run the macro.

***Note:** See Chapter 1 to learn how to run a macro.*

The current system time displays in the message box.


Microsoft Visual Basic - Ch 07 macros.xlsm - [ShowTimeExample (Code)]
(General)
ShowTime
1
2

```
Sub ShowTime()

    MsgBox ("Current Time: " & Time)

End Sub
```


Ch 07 macros.xlsm - Microsoft Excel
Developer
A1
Show Date
Show Time
Microsoft Excel
OK

Current Time: 10:29:23 PM

Extra

In Excel, you can convert dates and times into a serial value that Excel can add or subtract and then convert back into a recognizable date or time. Excel calculates a date's serial value as the number of days after January 1, 1900, and represents each date with a whole number. Excel calculates a time's serial value in units of 1/60 of a second. Each time can be represented as a serial value between 0 and 1. A date and time, such as January 1, 2000, at noon, consists of the date to the left of the decimal and a time to the right. In the example August 25, 2005, 5:46 p.m., the date and time serial value is 38589.74028.

VBA uses the same serial number system for dates and times as Excel. Each date and time is stored as a numeric value. Because VBA stores dates and times as numeric values, you can add and substract to perform date calculations.

Perform Date and Time Calculations

You can determine the amount of time between two dates by using the `DateDiff` VBA function. With this function, you can obtain time intervals between two date values, such as the number of months, days, hours, minutes, or seconds.

The `DateDiff` function takes five arguments: `Interval`, `Date1`, `Date2`, `Firstdayofweek`, and `Firstweekofyear`. The first three arguments are required. Use the `Interval` argument to specify the unit of time to use when returning the difference between the two dates. Use a constant value to specify the interval.

Use the Date1 and Date2 arguments to specify the dates you want to compare. You can use a date string, a value returned by a function, or the contents of a cell, as long as you use a valid date. To ensure the date is valid, you can use the `IsDate` VBA function, which returns the value `True` if an expression is a date.

You can use the optional `Firstdayofweek` argument if you want to use a day other than Sunday as the first day of the week. To create the constant value you use as this argument, type vb before the appropriate day of the week. For example, to use Monday as the first day of the week, type `vbMonday` as the argument value.

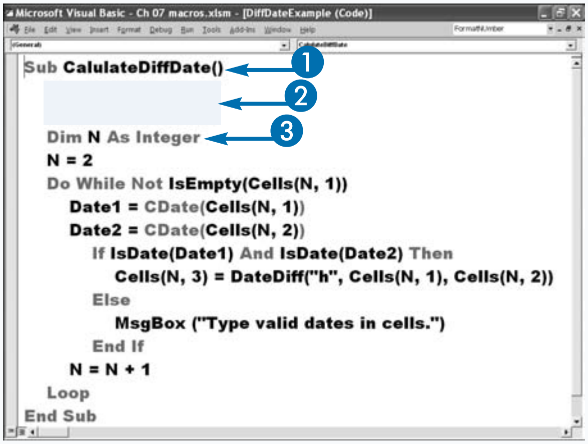
You can use the optional `Firstweekofyear` argument to indicate what you want to treat as the first week of the year. If you omit this argument, VBA considers the week that contains the date January 1 as the first week of the year. If you want to have the first week contain at least the first four days, specify a value of `vbFirstFourDays`. See Appendix A for a list of `Firstweekofyear` constant values.

Perform Date and Time Calculations

① Name your procedure.

② Declare the variables you want to use to store your dates.

③ Declare any other variables you need.


Microsoft Visual Basic - Ch 07 macros.xlsm - [DiffDateExample (Code)]
File
Edit
View
Insert
Format
Debug
Run
Tools
Add-Ins
Window
Help
FormatNumber
(General)
CalulateDiffDate
1
2
3

```
Sub CalulateDiffDate()

    Dim N As Integer
    N = 2
    Do While Not IsEmpty(Cells(N, 1))
        Date1 = CDate(Cells(N, 1))
        Date2 = CDate(Cells(N, 2))
            If IsDate(Date1) And IsDate(Date2) Then
                Cells(N, 3) = DateDiff("h", Cells(N, 1), Cells(N, 2))
            Else
                MsgBox ("Type valid dates in cells.")
            End If
        N = N + 1
    Loop
End Sub
```

This example uses a `Do While` loop and an `If Then Else` statement.

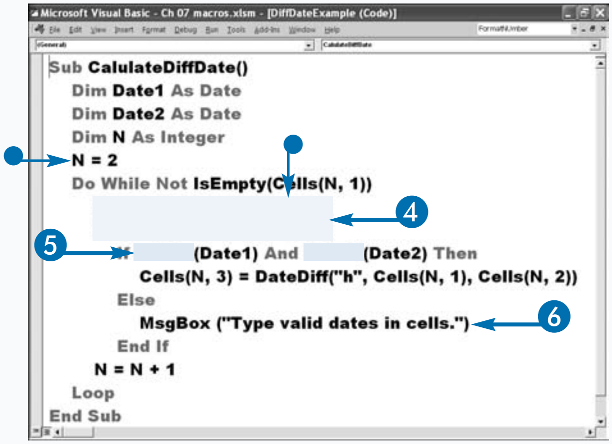
***Note:** See Chapter 6 to learn more about loops and `If Then Else` statements.*

- This example evaluates two columns of cells, starting at row two.

④ Store the cell values to variables.

⑤ Use the `IsDate` VBA function to make sure the cells contain valid dates.

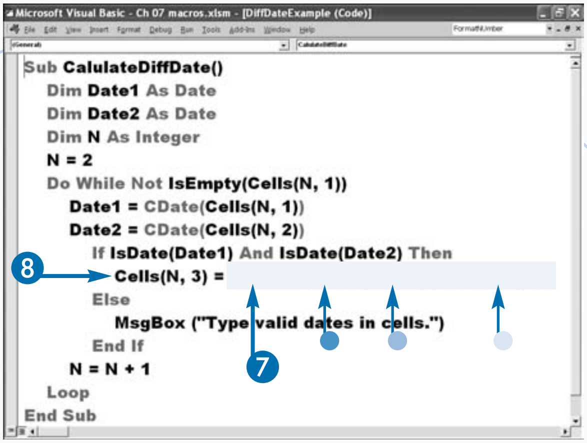
⑥ Use the `MsgBox` function to display an error message if the dates are not valid.


Microsoft Visual Basic - Ch 07 macros.xlsm - [DiffDateExample (Code)]
File
Edit
View
Insert
Format
Debug
Run
Tools
Add-Ins
Window
Help
FormatNumber
(General)
CalulateDiffDate
4
5
6

```
Sub CalulateDiffDate()
    Dim Date1 As Date
    Dim Date2 As Date
    Dim N As Integer
    N = 2
    Do While Not IsEmpty(Cells(N, 1))

            If (Date1) And (Date2) Then
                Cells(N, 3) = DateDiff("h", Cells(N, 1), Cells(N, 2))
            Else
                MsgBox ("Type valid dates in cells.")
            End If
        N = N + 1
    Loop
End Sub
```

7. Use the `DateDiff` function to determine the amount of time between two dates.
   - The Interval.
   - Date1.
   - Date2.
8. Place the results in a cell.
9. Press Alt+F11 to switch from the VBE to Excel, and then run the macro.

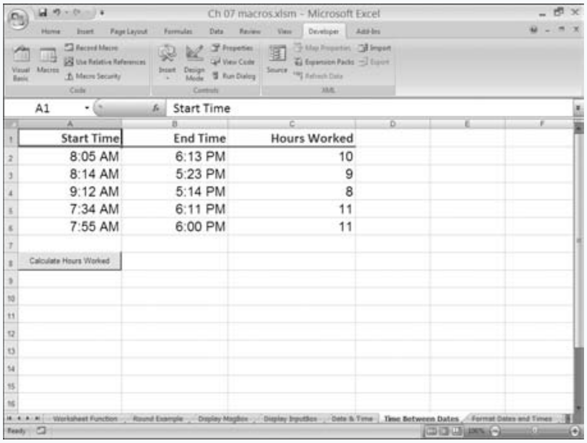
Note: *See Chapter 1 to learn how to run a macro.*


Microsoft Visual Basic - Ch 07 macros.xlsm - [DiffDateExample (Code)]
8
7

```
Sub CalulateDiffDate()
  Dim Date1 As Date
  Dim Date2 As Date
  Dim N As Integer
  N = 2
  Do While Not IsEmpty(Cells(N, 1))
    Date1 = CDate(Cells(N, 1))
    Date2 = CDate(Cells(N, 2))
      If IsDate(Date1) And IsDate(Date2) Then
        Cells(N, 3) =
      Else
        MsgBox ("Type valid dates in cells.")
      End If
    N = N + 1
  Loop
End Sub
```

The procedure calculates the difference between two times.

You can use the `DateDiff` function to find the difference between two times.



Start Time	End Time	Hours Worked
8:05 AM	6:13 PM	10
8:14 AM	5:23 PM	9
9:12 AM	5:14 PM	8
7:34 AM	6:11 PM	11
7:55 AM	6:00 PM	11

Extra

You can use one of ten constant values to specify the Interval argument and the type of date interval to return.

INTERVAL	VALUE	DESCRIPTION
yyyy	Year	Only compares the year portion of both dates. The dates 12/31/1999 and 1/1/2000 return a value of 1 year.
q	Quarter	Divides the year into four quarters and returns the number of quarters between dates.
m	Month	Only compares the month portion of both dates. The dates 12/31/1999 and 1/1/2000 return a value of 1 month.
d	Day	The number of days between two dates.
y	Day of Year	The same results as using d.
w	Weekday	Determines the day of the week of the first date — for example, Wednesday — and then counts the number of Wednesdays between the dates.
ww	Week	Relies on the value specified as the Firstdayofweek argument to determine the number of weeks between two dates.
h	Hour	The number of hours between to times. If a time is not specified, it uses midnight or 00:00:00.
n	Minute	The number of minutes between two times.
s	Second	The number of seconds between two times.

Format a Date Expression

You can format an expression that uses a date or time by using the `FormatDateTime` VBA function. The `FormatDateTime` function takes two arguments: `Date` and `NamedFormat`. The `Date` argument is required. It identifies the date expression that you want to format and accepts cell references, variable references, string expressions, or numeric values. You can reference a cell using any of the cell range reference options discussed in Chapter 11. For example, if the date you want to format is located in cell A1, you can use the following code to reference that cell:

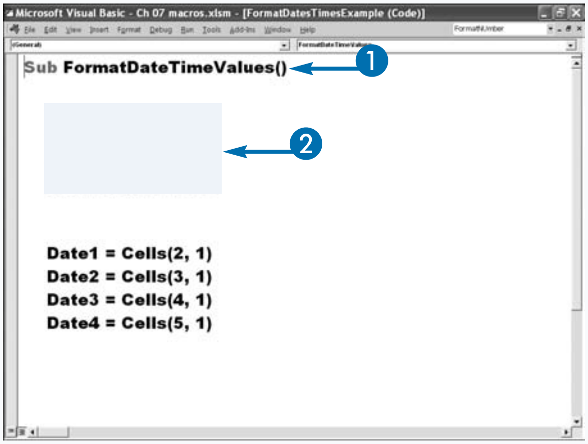
```
X = FormatDateTime(Range("A1"))
```

You use the `NamedFormat` argument to specify the formatting you want to use. You can use any of the predefined formatting constants. If you omit the `NamedFormat` argument, the `FormatDateTime` function uses the `vbGeneralDate` constant.

The `vbGeneralDate` constant instructs Excel to format the date portion of the expression in the system short date format and to format the time portion of the date in the system long time format. Windows maintains your default date and time settings in the Regional and Languages Options dialog box, which you can access through the Control panel. When you use a constant as the `NamedFormat` argument, you specify which of these settings you want to use to format your date and time values. By changing the values in the Regional and Languages Options dialog box, you affect how the dates and times display when you use the `FormatDateTime` function.

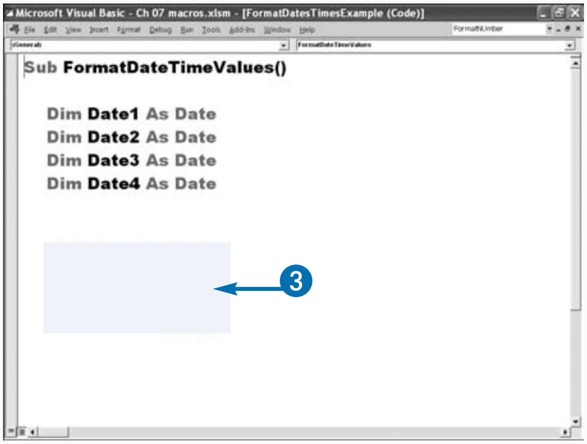
Format a Date Expression

1. Name your procedure.
2. Declare the variables you want to use to store your unformatted dates.


Microsoft Visual Basic - Ch 07 macros.xlsm - [FormatDatesTimesExample (Code)]
(General)
FormatDateTimeValues
1
2

```
Sub FormatDateTimeValues()

    Date1 = Cells(2, 1)
    Date2 = Cells(3, 1)
    Date3 = Cells(4, 1)
    Date4 = Cells(5, 1)
```

3. Store the contents of the cells with unformatted dates to variables.


Microsoft Visual Basic - Ch 07 macros.xlsm - [FormatDatesTimesExample (Code)]
(General)
FormatDateTimeValues
3

```
Sub FormatDateTimeValues()

    Dim Date1 As Date
    Dim Date2 As Date
    Dim Date3 As Date
    Dim Date4 As Date
```

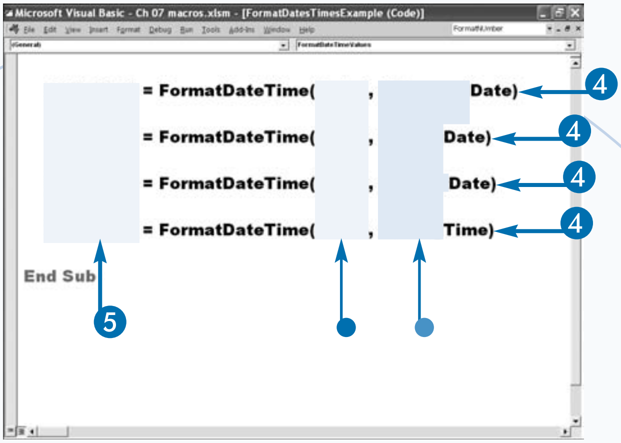
④ Use the `FormatDateTime` function to format the variables in which you stored the dates.

- The variable containing the date.
- The format you want to apply.

⑤ Assign the results to cells.

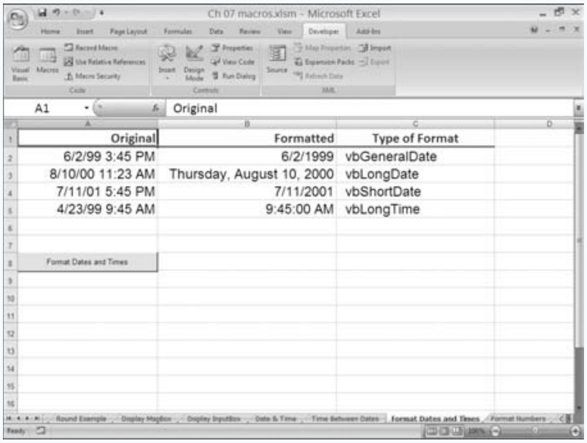
⑥ Press Alt+F11 to switch from the VBE to Excel, and then run the macro.

Note: *See Chapter 1 to learn how to run a macro.*


Microsoft Visual Basic - Ch 07 macros.xlsm - [FormatDatesTimesExample (Code)]
File
Edit
View
Insert
Format
Debug
Run
Tools
Add-Ins
Window
Help
(General)
FormatDateTimeValues
4
4
4
4
5

```
 = FormatDateTime(    ,      Date)
 = FormatDateTime(    ,    Date)
 = FormatDateTime(    ,    Date)
 = FormatDateTime(    ,    Time)
End Sub
```

The procedure formats the dates in column A and places the results in column B.


Ch 07 macros.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Visual Basic
Macros
Record Macro
Use Relative References
Macro Security
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
A1
Format Dates and Times
Ready

A1 Original

Original	Formatted	Type of Format
6/2/99 3:45 PM	6/2/1999	vbGeneralDate
8/10/00 11:23 AM	Thursday, August 10, 2000	vbLongDate
7/11/01 5:45 PM	7/11/2001	vbShortDate
4/23/99 9:45 AM	9:45:00 AM	vbLongTime

Extra

You can specify the formatting for a date and time by using the `NamedFormat` argument. If it is omitted, Excel uses the `vbGeneralDate` constant. When you use the `NamedFormat` argument, you can pass it a constant value or the numeric value that corresponds to the constant, as outlined in the following table. The actual formats used as a result of specifying these constant values are based upon the system date and time settings in the Regional and Language Options dialog box.

CONSTANT	VALUE	DESCRIPTION
vbGeneralDate	0	The default value if the `NamedFormat` argument is omitted. This value displays the date using the short date format and the time using the long time format.
vbLongDate	1	Displays the date using the system long date format.
vbShortDate	2	Displays the date using the system short date format.
vbLongTime	3	Displays the time using the system long time format.

Format a Numeric Expression

You can format a numeric expression by using the FormatNumber, FormatCurrency, or FormatPercentage function. These functions all take a numeric value and return the value formatted in the format you specify. The FormatNumber function returns a formatted number, the FormatCurrency function returns a formatted number preceded by a currency symbol, and the FormatPercentage function returns a number followed by a percentage sign.

Each function takes the same five arguments: Expression, NumDigitsAfterDecimal, IncludeLeadingDigit, UseParensForNegativeNumbers, and GroupDigits. The Expression argument is required.

The Expression argument specifies the numeric value to format. The NumDigitsAfterDecimal argument indicates the number of decimal places to display on the right side of the decimal. The IncludeLeadingDigit argument determines whether a zero displays before fractional values. The UseParensForNegativeNumbers argument specifies whether to place parentheses around negative numbers. Finally, the GroupDigits argument determines whether Excel groups numbers to make them more readable. With this argument, you can specify whether to display fifty thousand as 50,000 or 50000.

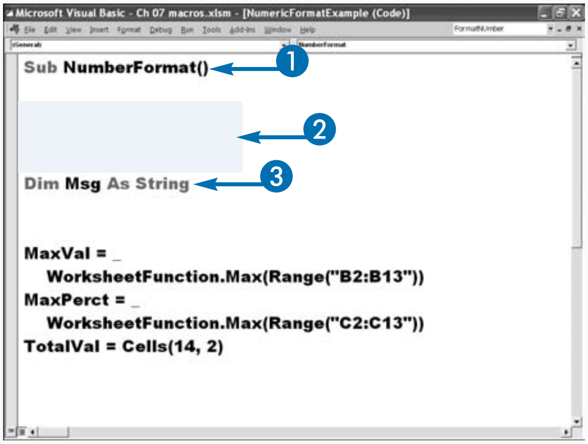
The last three arguments, IncludeLeadingDigit, UseParensForNegativeNumbers, and GroupDigits, all use the same three constant values. Use vbTrue as the argument to use the formatting, and vbFalse if you do not want to use the formatting. If you do not specify a value, or if you specify vbUseDefault, the function uses your computer's regional settings.

Format a Numeric Expression

① Name your procedure.

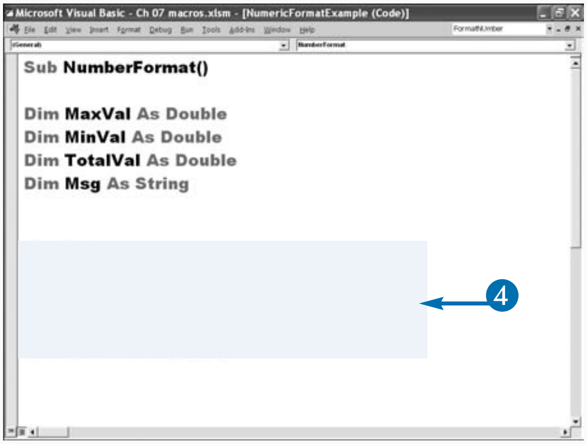
② Declare the variables you want to use to store your formatted numbers.

③ Declare any other variable you need.


Microsoft Visual Basic - Ch 07 macros.xlsm - [NumericFormatExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
NumberFormat
1
2
3

```
Sub NumberFormat()

Dim Msg As String


MaxVal = _
   WorksheetFunction.Max(Range("B2:B13"))
MaxPerct = _
   WorksheetFunction.Max(Range("C2:C13"))
TotalVal = Cells(14, 2)
```

④ Store the numeric values you want to format to variables.


Microsoft Visual Basic - Ch 07 macros.xlsm - [NumericFormatExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
NumberFormat
4

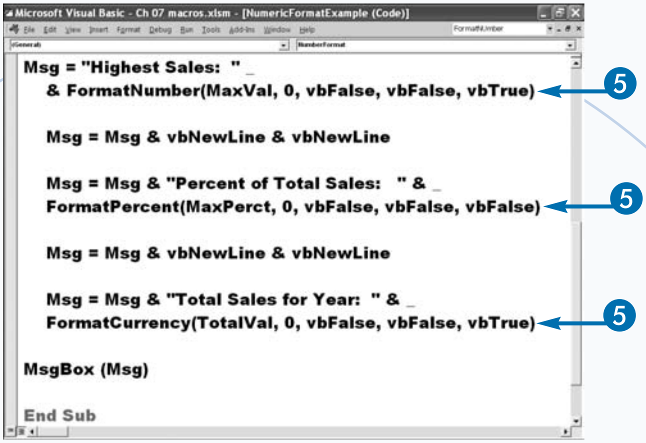
```
Sub NumberFormat()

Dim MaxVal As Double
Dim MinVal As Double
Dim TotalVal As Double
Dim Msg As String
```

⑤ Apply a format to the variables.

In this example, the formatted numbers are part of the message box prompt.

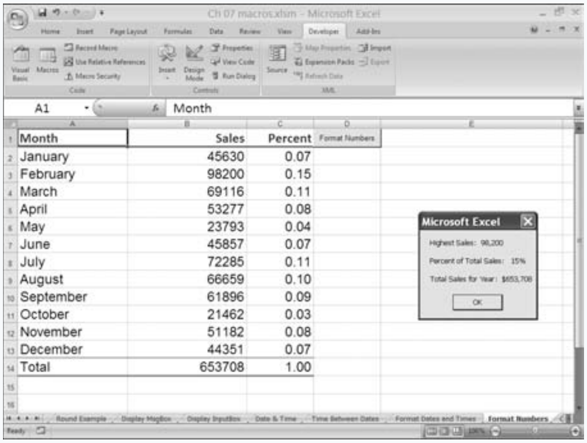
⑥ Press Alt+F11 to switch from the VBE to Excel, and then run the macro.

Note: *See Chapter 1 to learn how to run a macro.*


Microsoft Visual Basic - Ch 07 macros.xlsm - [NumericFormatExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
NumberFormat
5
5
5

```
Msg = "Highest Sales:  " _
   & FormatNumber(MaxVal, 0, vbFalse, vbFalse, vbTrue)

   Msg = Msg & vbNewLine & vbNewLine

   Msg = Msg & "Percent of Total Sales:  " & _
   FormatPercent(MaxPerct, 0, vbFalse, vbFalse, vbFalse)

   Msg = Msg & vbNewLine & vbNewLine

   Msg = Msg & "Total Sales for Year:  " & _
   FormatCurrency(TotalVal, 0, vbFalse, vbFalse, vbTrue)

MsgBox (Msg)

End Sub
```

In this example, the procedure formats the numbers and displays the results in a message box.


Ch 07 macros.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
A1
Month
Microsoft Excel
OK
Ready

Month	Sales	Percent	Format Numbers
January	45630	0.07	
February	98200	0.15	
March	69116	0.11	
April	53277	0.08	
May	23793	0.04	
June	45857	0.07	
July	72285	0.11	
August	66659	0.10	
September	61896	0.09	
October	21462	0.03	
November	51182	0.08	
December	44351	0.07	
Total	653708	1.00	

Highest Sales: 98,200

Percent of Total Sales: 15%

Total Sales for Year: $653,708

Extra

If you want to customize the way a number displays, you can also use the `Format` function. You can create your own number formats by combining specific characters along with symbols that represent the numbers, as in the following example: Format(NumVal, “##.##”).

NUMERIC CHARACTERS	DISPLAYS
0	A numeric digit or a zero if the number does not have a digit in that place. Use this character to ensure that a digit appears in a specific place. For example, 0000 always displays a four-digit number. If there are fewer digits, a zero displays for the non-specified digits.
#	A numeric digit if the number has a digit in that place. If there is no digit, a value does not display in that place.
.	A decimal-point placeholder.
%	An expression as a percentage by multiplying by 100 and adding a percent sign.
,	A thousands separator.
E-, E+, e-, e+	A numeric expression in scientific format. The number of digits on the right side of the symbol indicates the number of digits in the exponent.
\	The character that follows a backslash or is enclosed in quotes. For example, to place a plus sign (+) in the number string, you would type \+ in the desired location.

Change the Case of a String

You can use the `LCase` and `UCase` VBA functions to change the case of your text. This is useful when you are formatting output or when you want to compare strings without regard to case. The `LCase` function changes all characters that are not already lowercase, to lowercase. The `UCase` function changes all characters that are not already uppercase, to uppercase.

To use the `LCase` function, simply type **LCase** followed by the expression you want to convert to lowercase in parentheses.

Example:

```
MyVariable = "HELLO"
SampleText = LCase(MyVariable)
```

Result:

```
hello
```

The syntax for the `UCase` function is similar to the syntax for the `LCase` function. To use the `UCase` function, you type `UCase` followed by the expression you want to convert to uppercase in parentheses.

Example:

```
MyVariable = "hello"
SampleText = UCase(MyVariable)
```

Result:

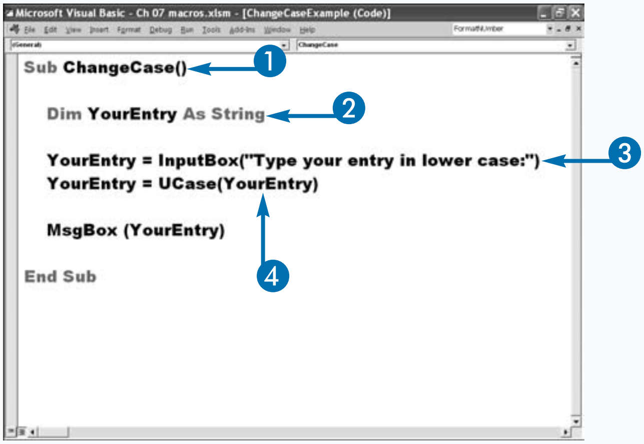
```
HELLO
```

Both the `LCase` and the `UCase` functions ignore numbers and symbols. The expression can be an actual string enclosed in quotes, or a reference to a string such as a cell or variable name. If the string contains no data, both functions return Null.

Change the Case of a String

1. Name your procedure.
2. Declare your variable.
3. Use an `InputBox` function to retrieve a user entry.
4. Use the `UCase` function to change the entry to uppercase.

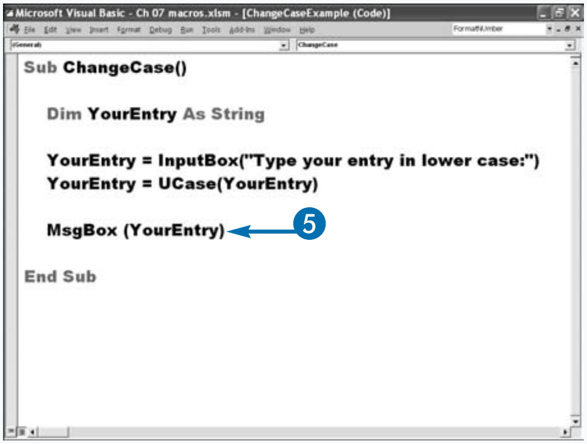
   Alternatively, you can use the `LCase` function to change the entry to lowercase.


Microsoft Visual Basic - Ch 07 macros.xlsm - [ChangeCaseExample (Code)]
(General)
ChangeCase
1
2
3
4

```
Sub ChangeCase()

    Dim YourEntry As String

    YourEntry = InputBox("Type your entry in lower case:")
    YourEntry = UCase(YourEntry)

    MsgBox (YourEntry)

End Sub
```

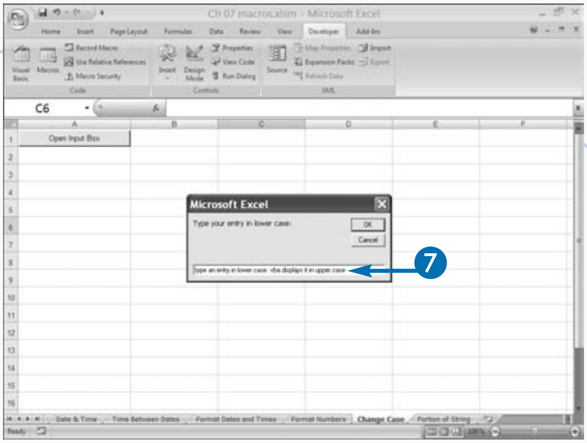
5. Use a message box to display the entry.
6. Press Alt+F11 to switch from the VBE to Excel, and then run the macro.

***Note:** See Chapter 1 to learn how to run a macro.*


Microsoft Visual Basic - Ch 07 macros.xlsm - [ChangeCaseExample (Code)]
(General)
ChangeCase
5

```
Sub ChangeCase()

    Dim YourEntry As String

    YourEntry = InputBox("Type your entry in lower case:")
    YourEntry = UCase(YourEntry)

    MsgBox (YourEntry)

End Sub
```

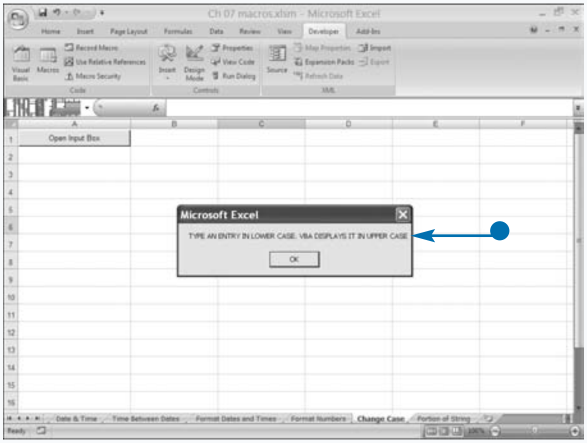
7. Make an entry using lowercase text.


Ch 07 macros.xlsm - Microsoft Excel
C6
Open Input Box
Microsoft Excel
OK
Cancel
7
Date & Time
Time Between Dates
Format Dates and Times
Format Numbers
Change Case
Portion of String
Ready

Type your entry in lower case:

type an entry in lower case. vba displays it in upper case

- The message box displays the text in uppercase.


Ch 07 macros.xlsm - Microsoft Excel
Open Input Box
Microsoft Excel
OK
Date & Time
Time Between Dates
Format Dates and Times
Format Numbers
Change Case
Portion of String
Ready

TYPE AN ENTRY IN LOWER CASE. VBA DISPLAYS IT IN UPPER CASE

Apply It

The example used in the section, "Using the InputBox Function," earlier in this chapter, converts the user's entry to lowercase and then compares the entry to a string. Converting the entry to lowercase allows you to make a comparison without regard to case. For example, if the user types **GREEN**, **green**, or **GrEen**, the procedure returns the value `True` when it compares the user input to green.

Example:

```
If LCase(UserInput) = "blue" Then
      Inventory = IBlue
ElseIf LCase(UserInput) = "green" Then
      Inventory = IGreen
ElseIf LCase(UserInput) = "red" Then
      Inventory = IRed
ElseIf LCase(UserInput) = "silver" Then
      Inventory = ISilver
Else
      Inventory = 0
End If
```

To see this function in action, refer to the example file for Chapter 7, which is on the Web site for this book.

Return a Portion of a String

Instead of an entire string, you can use the built-in functions available in VBA to return a portion of a string. You can use three different functions: `Left`, `Right`, and `Mid`. The `Left` function returns the specified number of characters starting at the left side, or beginning, of the string. The `Right` function returns the specified number of characters starting at the right side, or end, of the string. These functions use similar syntax: `Left(String, Length)` and `Right(String, Length)`.

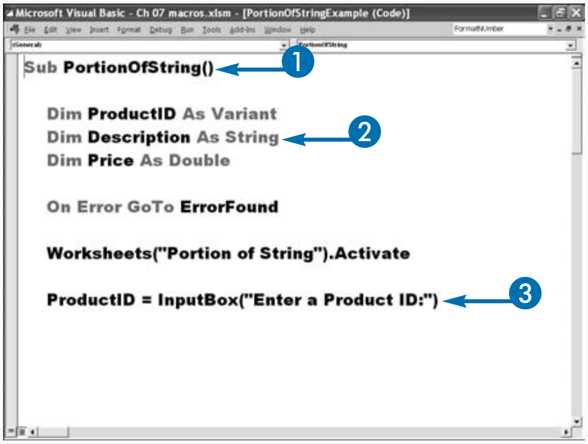
The `String` argument specifies the string from which you want to return the specified number of characters. You can make the argument an actual string enclosed in quotes, a variable that contains a string, or a cell reference. The `Length` argument indicates the number of characters to return from the string.

The third built-in function for returning a portion of a string is the `Mid` function. Use this function to retrieve characters from the center of a string. When you use this function, you indicate the character with which to start and how many characters to return. There are three `Mid` function arguments: `Mid(String, Start, Length)`.

Similar to the `Left` and `Right` functions, the `Mid` function `String` argument specifies the string to use with the function. The `Start` argument indicates the position of the first character in the string to return. The `Length` argument is the only optional argument when using the `Mid` function. If you omit the length argument, the function returns the remaining portion of the string. Otherwise, the `Length` argument indicates the number of characters to return.

Return a Portion of a String

1. Name your procedure.
2. Declare your variables.
3. Use an `InputBox` function to capture a user entry.

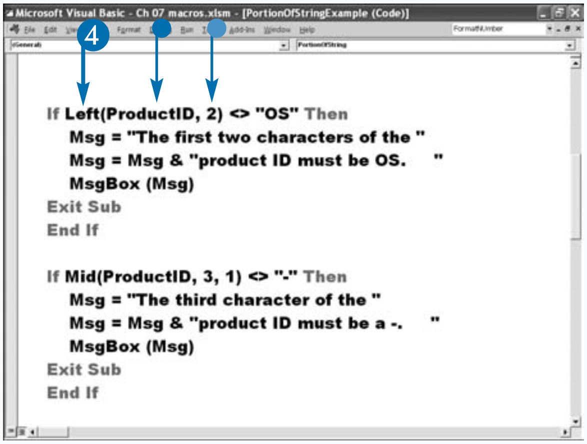

Microsoft Visual Basic - Ch 07 macros.xlsm - [PortionOfStringExample (Code)]
1
2
3

```
Sub PortionOfString()

    Dim ProductID As Variant
    Dim Description As String
    Dim Price As Double

    On Error GoTo ErrorFound

    Worksheets("Portion of String").Activate

    ProductID = InputBox("Enter a Product ID:")
```

4. Use the `Left` function to retrieve the left portion of a user entry.

- The variable that you want to examine.
- The number of characters from the left you want to retrieve.

In this example, if the first two characters of the user entry are not "OS", then the user receives an error message.

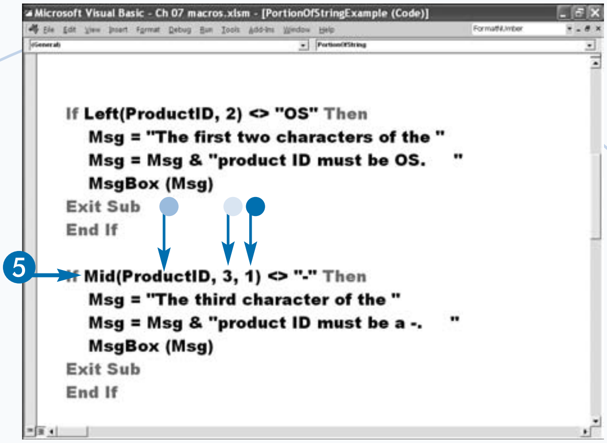

Microsoft Visual Basic - Ch 07 macros.xlsm - [PortionOfStringExample (Code)]
4

```
    If Left(ProductID, 2) <> "OS" Then
        Msg = "The first two characters of the "
        Msg = Msg & "product ID must be OS.     "
        MsgBox (Msg)
    Exit Sub
    End If

    If Mid(ProductID, 3, 1) <> "-" Then
        Msg = "The third character of the "
        Msg = Msg & "product ID must be a -.     "
        MsgBox (Msg)
    Exit Sub
    End If
```

5 Use the `Mid` function to retrieve a portion of a string.

- The variable you want to examine.
- The position of the first character you want to return.
- The number of characters you want to return.

In this example, if the third character of the user entry is not a "-", then the user receives an error message.

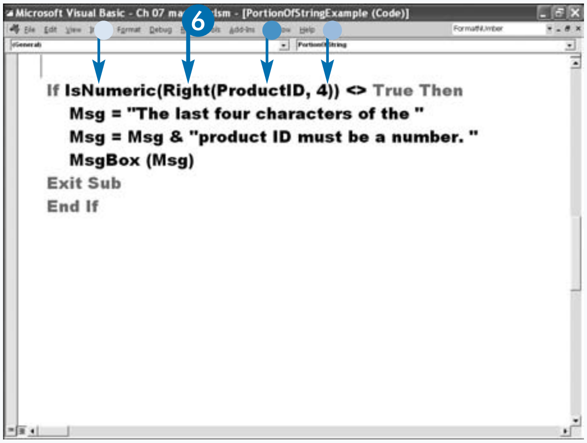

Microsoft Visual Basic - Ch 07 macros.xlsm - [PortionOfStringExample (Code)]
(General)
PortionOfString
5

```
If Left(ProductID, 2) <> "OS" Then
    Msg = "The first two characters of the "
    Msg = Msg & "product ID must be OS.    "
    MsgBox (Msg)
Exit Sub
End If

If Mid(ProductID, 3, 1) <> "-" Then
    Msg = "The third character of the "
    Msg = Msg & "product ID must be a -.    "
    MsgBox (Msg)
Exit Sub
End If
```

6 Use the `Right` function to retrieve the right portion of the user entry.

- The variable that you want to examine.
- The number of characters from the right you want to retrieve.
- This example uses the `IsNumeric` function.

In this example, if the last four characters of the user entry are not numbers, then the user receives an error message.


Microsoft Visual Basic - Ch 07 macros.xlsm - [PortionOfStringExample (Code)]
(General)
PortionOfString
6

```
If IsNumeric(Right(ProductID, 4)) <> True Then
    Msg = "The last four characters of the "
    Msg = Msg & "product ID must be a number. "
    MsgBox (Msg)
Exit Sub
End If
```

Apply It

You can use the `IsNumeric` VBA function to determine if a value is a number. The `IsNumeric` function takes one argument, the value you want to examine. The `IsNumeric` function returns `True` when the value is a number, and `False` when the value is not a number.

You can determine the length of a string with the `Len` function, `Len(String)`, which takes one argument, `String`. You can make the string argument an actual string, or the name of a variable that contains a string. The following example checks to see if the length of the string is not equal to 7. If the length of the string is not equal to 7, the procedure displays an error message.

Example:

```
Dim ProductID As String
ProductID = InputBox("Enter a ProductID:")
If Len(ProductID) <> 7 Then
      MsgBox("The Product ID must be 7
      characters long.")
Exit Sub
End If
```

Debug a Procedure with Inserted Break Points

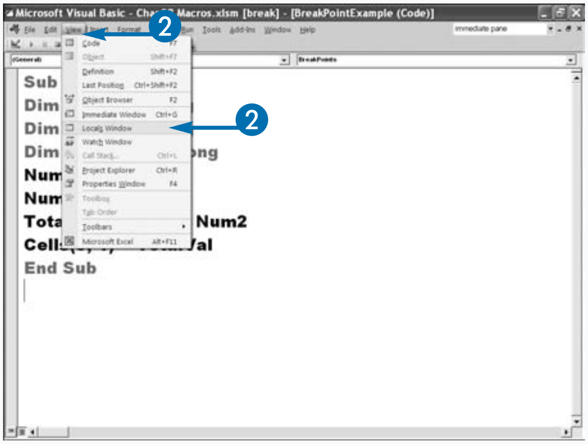
Correcting errors, often referred to as *debugging,* is a normal part of writing a program. VBA has several tools you can use to help debug your procedures. For example, you can insert break points in your procedures. Break points suspend the execution of your procedure at the points you specify. Once the program stops, you can examine the results and then continue the execution of the program.

You set a break point by clicking the margin of the Code window next to the line at which you want to insert the break point. The VBE places a circle in the margin and highlights the line of code using the display options you set for the Code window. See Chapter 2 for more information on setting the display options for the Code window. While in the Break mode, if you move your cursor over a variable name, the value of the variable appears.

The VBE has a Locals window, which displays the expressions in your procedure, their current value, and their type. When you are debugging your code, you should dock the Locals window at the button of the VBE. You can then use the Locals window to view the value of expressions and variables at each break point. See Chapter 2 for more information on using the VBE windows.

When your procedure stops at a specified break point, VBA places you in break mode and stops the current procedure from running. You can continue running your procedure until it encounters another break point or the procedure ends. Each time VBA encounters a break point, the current values of the local variables appear in the Locals window.

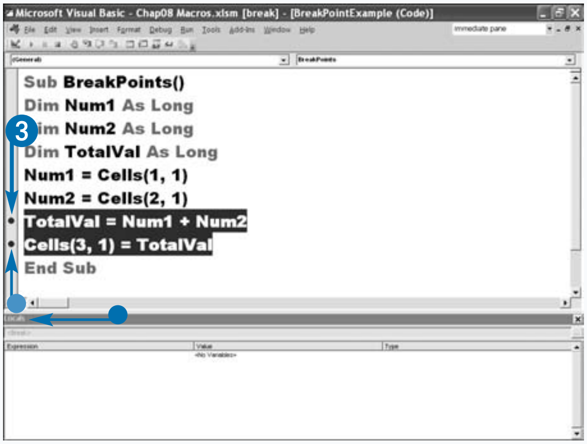
Debug a Procedure with Inserted Break Points


Microsoft Visual Basic - Chap08 Macros.xlsm [break] - [BreakPointExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Immediate pane
(General)
BreakPoints
Code F7
Object Shift+F7
Definition Shift+F2
Last Position Ctrl+Shift+F2
Object Browser F2
Immediate Window Ctrl+G
Locals Window
Watch Window
Call Stack... Ctrl+L
Project Explorer Ctrl+R
Properties Window F4
Toolbox
Tab Order
Toolbars
Microsoft Excel Alt+F11
2
2

1. In Project Explorer, open the module containing the procedure you want to debug.

   To open a module, double-click the module name.

2. Click View ➪ Locals Window.


Microsoft Visual Basic - Chap08 Macros.xlsm [break] - [BreakPointExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Immediate pane
(General)
BreakPoints
3
Locals
<Break>
Expression
Value
Type
<No Variables>

```
Sub BreakPoints()
Dim Num1 As Long
Dim Num2 As Long
Dim TotalVal As Long
Num1 = Cells(1, 1)
Num2 = Cells(2, 1)
TotalVal = Num1 + Num2
Cells(3, 1) = TotalVal
End Sub
```

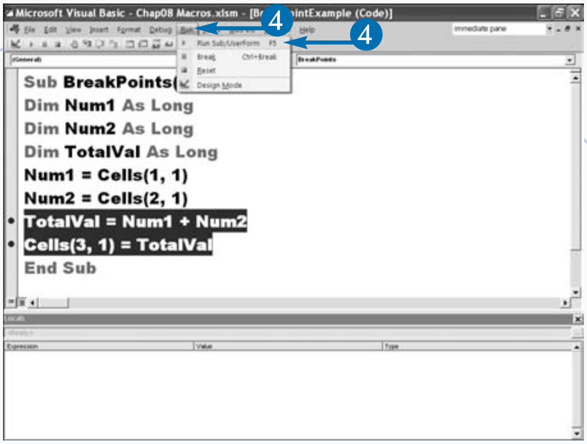
- The Locals window appears.

3. Click in the margin where you want to add a break point.

- You can add additional break points as needed.

④ Click Run ➪ Run Sub/UserForm.

Alternatively, press F5.


Microsoft Visual Basic - Chap08 Macros.xlsm - [BreakPointExample (Code)]
File
Edit
View
Insert
Format
Debug
Run
Help
Run Sub/UserForm F5
Break Ctrl+Break
Reset
Design Mode
Immediate pane
(General)
BreakPoints
Locals
<Ready>
Expression
Value
Type
4
4

```
Sub BreakPoints(
Dim Num1 As Long
Dim Num2 As Long
Dim TotalVal As Long
Num1 = Cells(1, 1)
Num2 = Cells(2, 1)
TotalVal = Num1 + Num2
Cells(3, 1) = TotalVal
End Sub
```

- The values of the locally declared variables display in the Locals window.

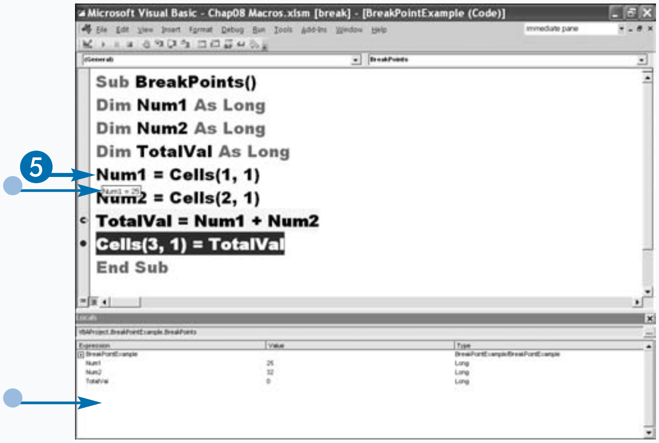
⑤ Move you cursor over a variable name to see the current value.

- The value of the variable appears.

⑥ Press F5 to run the procedure.

Click Run ➪ Reset to stop.

Click Debug ➪ Clear All Breakpoints to clear all break points.


Microsoft Visual Basic - Chap08 Macros.xlsm [break] - [BreakPointExample (Code)]
File
Edit
View
Insert
Format
Debug
Run
Tools
Add-Ins
Window
Help
Immediate pane
(General)
BreakPoints
Num1 = 25
Locals
5

```
Sub BreakPoints()
Dim Num1 As Long
Dim Num2 As Long
Dim TotalVal As Long
Num1 = Cells(1, 1)
Num2 = Cells(2, 1)
TotalVal = Num1 + Num2
Cells(3, 1) = TotalVal
End Sub
```

VBAProject.BreakPointExample.BreakPoints

Expression	Value	Type
⊞ BreakPointExample		BreakPointExample/BreakPointExample
Num1	25	Long
Num2	32	Long
TotalVal	0	Long

Extra

The VBE has three different modes: Design, Run, and Break. You use the Design mode to create new VBA procedures. You use the Run mode to execute a procedure. To activate the Run mode, click Run ➪ Run Sub/UserForm, or press F5. The VBE runs your procedure.

The VBE places you in the break mode whenever a procedure stops running due to a break point, a Stop statement, or a Watch statement, or when it encounters an error during execution. When the VBE places you in the break mode, the VBE highlights the line of code that caused the error and places the word *break* in the caption of the title bar. To exit the break mode, click Run ➪ Reset.

If you select a line of code, you can toggle a break point on and off by pressing F9 or by clicking Debug ➪ Toggle Breakpoint. You can remove a break point by clicking it with your mouse. You can clear all break points from your code by pressing Ctrl+Shift+F9 or by clicking Debug ➪ Clear All Breakpoints. Remember to clear all break points after you finish debugging your code.

Using the Watches Window to Debug a Procedure

If you suspect an error occurs at a particular break point, when a variable or expression reaches a certain value, or when the value of a variable or expression changes, the Watches window can be of use to you.

You can use the Add Watch dialog box to set up a watch. You start by entering an expression in the Expression field. For example, if you suspect that an error occurs when the variable K is equal to two, you can enter the expression `K = 2` to have your procedure break when the variable K is equal to two. In the Procedure field of the Add Watch dialog box, select the proper procedure. In the Module field, select the proper module. If you have multiple procedures or modules that call one another and you are not sure which procedure is causing the error, you can opt to monitor all procedures and/or all modules.

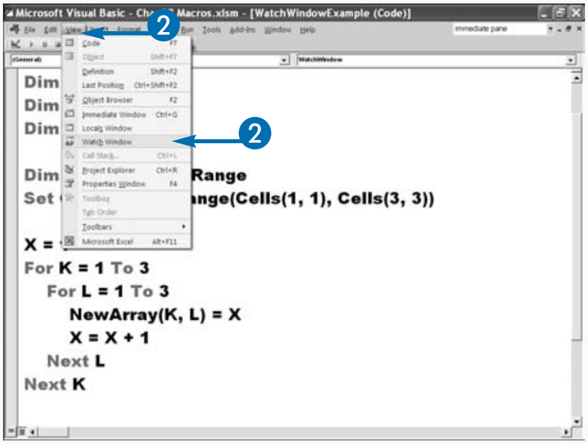
The Add Watch dialog box offers three watch types: Watch Expression, Break When Value Is True, and Break When Value Changes. You can set a break point and select Watch Expression to display the expression you are evaluating and its current value in the Watches window when your procedure breaks. You can select Break When Value Is True to have your procedure break when an expression evaluates to `True`. For example, by using this option, you can break when the variable K is equal to two. You can select Break When Value Changes to have you procedure break when the value of an expression changes. For example, if you are using a counter, you can break every time the variable you are using to count changes.

Using the Watches Window to Debug a Procedure

① In the Project Explorer, open the module containing the procedure you want to debug.

To open a module, double-click the module name.

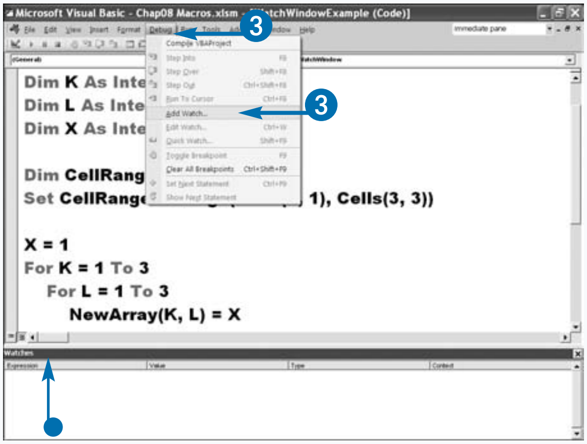
② Click View ➪ Watch Window.


Microsoft Visual Basic - Ch… Macros.xlsm - [WatchWindowExample (Code)]
File
Edit
View
Run
Tools
Add-Ins
Window
Help
Immediate pane
(General)
WatchWindow
Code F7
Object Shift+F7
Definition Shift+F2
Last Position Ctrl+Shift+F2
Object Browser F2
Immediate Window Ctrl+G
Locals Window
Watch Window
Call Stack... Ctrl+L
Project Explorer Ctrl+R
Properties Window F4
Toolbox
Tab Order
Toolbars
Microsoft Excel Alt+F11
2
2

```
Dim
Dim
Dim

Dim        Range
Set        nge(Cells(1, 1), Cells(3, 3))

X =
For K = 1 To 3
   For L = 1 To 3
      NewArray(K, L) = X
      X = X + 1
   Next L
Next K
```

- The Watches window appears.

③ Click Debug ➪ Add Watch.


Microsoft Visual Basic - Chap08 Macros.xlsm - …tchWindowExample (Code)]
File
Edit
View
Insert
Format
Debug
Tools
Help
Immediate pane
(General)
WatchWindow
Compile VBAProject
Step Into F8
Step Over Shift+F8
Step Out Ctrl+Shift+F8
Run To Cursor Ctrl+F8
Add Watch...
Edit Watch... Ctrl+W
Quick Watch... Shift+F9
Toggle Breakpoint F9
Clear All Breakpoints Ctrl+Shift+F9
Set Next Statement Ctrl+F9
Show Next Statement
Watches
Expression
Value
Type
Context
3
3

```
Dim K As Inte
Dim L As Inte
Dim X As Inte

Dim CellRang
Set CellRange                1), Cells(3, 3))

X = 1
For K = 1 To 3
   For L = 1 To 3
      NewArray(K, L) = X
```

- The Add Watch dialog box appears.

4 Type the expression to watch in the Expression field.

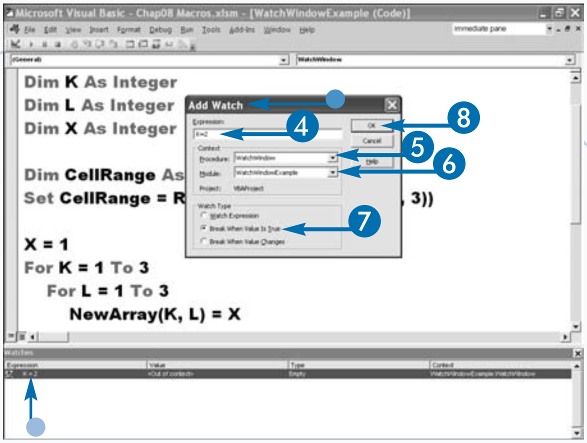
5 Click here and select a procedure.

6 Click here and select a module.

7 Click to select a watch type (○ changes to ◉).

8 Click OK.

- The Watches window lists each watch.


Microsoft Visual Basic - Chap08 Macros.xlsm - [WatchWindowExample (Code)]
File
Edit
View
Insert
Format
Debug
Run
Tools
Add-Ins
Window
Help
Immediate pane
(General)
WatchWindow
Add Watch
OK
Cancel
Help
4
5
6
7
8
Watches
Expression
Value
Type
Context

```
Dim K As Integer
Dim L As Integer
Dim X As Integer

Dim CellRange As
Set CellRange = R                    , 3))

X = 1
For K = 1 To 3
  For L = 1 To 3
    NewArray(K, L) = X
```

Expression: K=2

Context

Procedure: WatchWindow

Module: WatchWindowExample

Project: VBAProject

Watch Type

○ Watch Expression

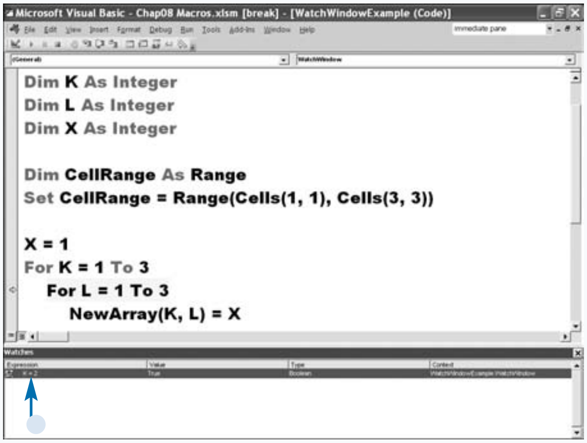
◉ Break When Value Is True

○ Break When Value Changes

Expression	Value	Type	Context
K = 2	<Out of context>	Empty	WatchWindowExample.WatchWindow

9 Press F5 to run your procedure.

- The procedure breaks when the expression you entered evaluates to `True`.


Microsoft Visual Basic - Chap08 Macros.xlsm [break] - [WatchWindowExample (Code)]
File
Edit
View
Insert
Format
Debug
Run
Tools
Add-Ins
Window
Help
Immediate pane
(General)
WatchWindow
Watches
Expression
Value
Type
Context

```
Dim K As Integer
Dim L As Integer
Dim X As Integer

Dim CellRange As Range
Set CellRange = Range(Cells(1, 1), Cells(3, 3))

X = 1
For K = 1 To 3
  For L = 1 To 3
    NewArray(K, L) = X
```

Expression	Value	Type	Context
K = 2	True	Boolean	WatchWindowExample.WatchWindow

Extra

When you are in the Break mode, you can find the current value of a variable or expression by using VBA's Quick Watch feature. Select the variable or expression for which you want to find the value. Click Debug ➪ Quick Watch or press Shift+F9. The current value of the expression appears in the Quick Watch dialog box. If you want to continue to monitor the variable or expression value, click Add to add the item to the Watches window.

To delete a watch, right-click in the Watches window and then click Delete Watch in the context menu that appears. To edit a watch, right-click the watch you want to edit and then click Edit Watch in the context menu. The Edit Watch dialog box appears. Use it to edit your watch.

When evaluating an expression, such as `X > 5`, the value in the Watches window is either `True` or `False`, indicating whether the expression is valid. For example, if the current value of X is 6, the expression `X > 5` has a value of `True` because 6 is greater than 5.

Step through a Procedure

Programmers call the process of stepping through code one line at a time *tracing*. With break points, VBA executes the code until it encounters a break point. With tracing, VBA executes one line of code and waits for you to indicate that you want to execute the next line of code. Tracing is an excellent way to debug your code when you do not know where your error is located.

As you step through your code, you can use the Watches and Locals windows to monitor the value of variables and expressions. See the section, "Using the Watches Window to Debug a Procedure," to learn more about the Watches window. See the section, "Debug a Procedure with Inserted Break Points," to learn more about the Locals window.

You start tracing by executing the Step Into command on the Debug menu, or by pressing the F8 key to begin the tracing process. When you are ready to move to the next statement, you execute the Step Into command or press the F8 key again. You can continue executing the Step Into command or pressing F8 for each line of code you want to execute.

Each time you execute the Step Into command or press F8, the VBE highlights the next line of code. The Locals window updates the value of the local variables and the Watches window monitors the values of any watch expressions created for the procedure.

As you step through a procedure, if a code statement calls another procedure, the VBE also steps through the called procedure. After that procedure runs, the control returns to the original procedure.

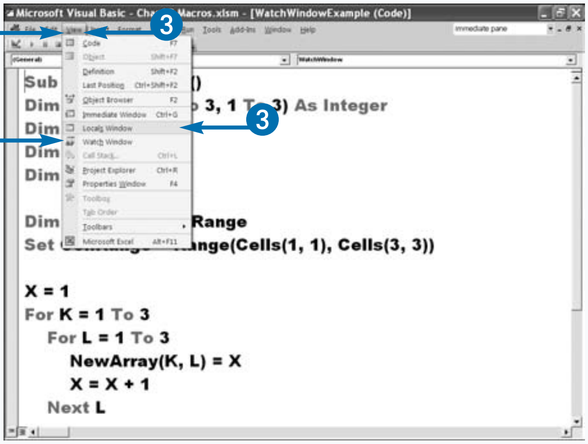
Step through a Procedure

① In the Project Explorer, open the module containing the procedure you want to debug.

To open a module, double-click the module name.

② Click View ➪ Watch Window.

③ Click View ➪ Locals Window.


Microsoft Visual Basic - Cha Macros.xlsm - [WatchWindowExample (Code)]
2
3
Code F7
Object Shift+F7
Definition Shift+F2
Last Position Ctrl+Shift+F2
Object Browser F2
Immediate Window Ctrl+G
Locals Window
Watch Window
Call Stack... Ctrl+L
Project Explorer Ctrl+R
Properties Window F4
Toolbox
Tab Order
Toolbars
Microsoft Excel Alt+F11
(General)
WatchWindow
Immediate pane

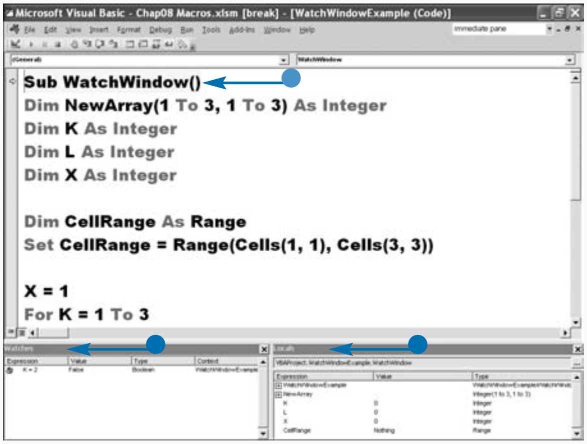
```
Sub              ()
Dim              3, 1 T  3) As Integer
Dim
Dim
Dim

Dim              Range
Set              nge(Cells(1, 1), Cells(3, 3))

X = 1
For K = 1 To 3
  For L = 1 To 3
    NewArray(K, L) = X
    X = X + 1
  Next L
```

- The Watches and Locals windows appear.

④ Press F8.

Alternatively, click Debug ➪ Step Into.

- As you begin stepping into the code, VBA highlights the first line of code.


Microsoft Visual Basic - Chap08 Macros.xlsm [break] - [WatchWindowExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Immediate pane
(General)
WatchWindow
Watches
Locals

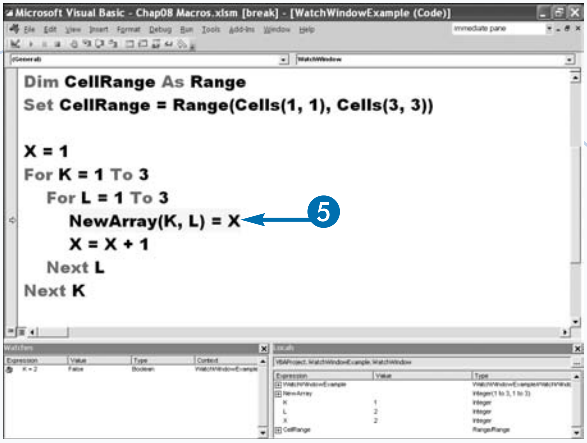
```
Sub WatchWindow()
Dim NewArray(1 To 3, 1 To 3) As Integer
Dim K As Integer
Dim L As Integer
Dim X As Integer

Dim CellRange As Range
Set CellRange = Range(Cells(1, 1), Cells(3, 3))

X = 1
For K = 1 To 3
```

Expression	Value	Type	Context
K = 2	False	Boolean	WatchWindowExample

VBAProject.WatchWindowExample.WatchWindow

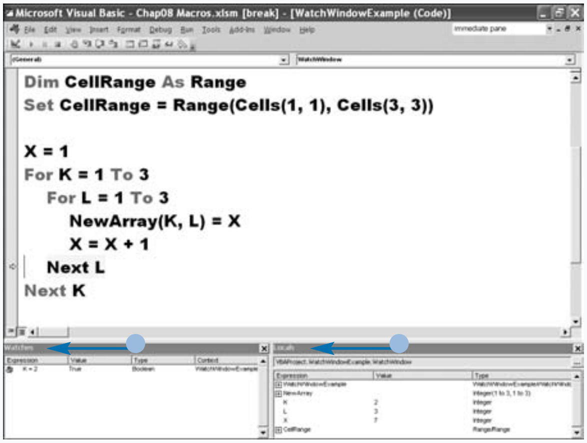
Expression	Value	Type
⊞ WatchWindowExample		WatchWindowExample/WatchWind
⊞ NewArray		Integer(1 to 3, 1 to 3)
K	0	Integer
L	0	Integer
X	0	Integer
CellRange	Nothing	Range

⑤ Continue pressing F8 to step through the entire procedure.


Microsoft Visual Basic - Chap08 Macros.xlsm [break] - [WatchWindowExample (Code)]
(General)
WatchWindow
5
Watches
Locals

```
Dim CellRange As Range
Set CellRange = Range(Cells(1, 1), Cells(3, 3))

X = 1
For K = 1 To 3
   For L = 1 To 3
      NewArray(K, L) = X
      X = X + 1
   Next L
Next K
```

- As you step through the code, local variable values appear in the Locals window, and any watches that are set appear in the Watches window.


Microsoft Visual Basic - Chap08 Macros.xlsm [break] - [WatchWindowExample (Code)]
(General)
WatchWindow
Watches
Locals

```
Dim CellRange As Range
Set CellRange = Range(Cells(1, 1), Cells(3, 3))

X = 1
For K = 1 To 3
   For L = 1 To 3
      NewArray(K, L) = X
      X = X + 1
   Next L
Next K
```

Extra

You step into procedures by pressing F8 or by clicking Debug ➪ Step Into. If your procedure contains calls to other procedures, you can step through those procedures by using the Step Into command. If you do not want to step through called procedures, you can step over them. To step over a called procedure, click Debug ➪ Step Over or press Shift+F8. VBA executes the entire called procedure without stopping and then returns control to the next line in the original procedure.

If you decide to step through the called procedure, you still have the option of stepping out of it at any time. To step out of a called procedure, click Debug ➪ Step Out or press Ctrl+Shift+F8. The remainder of the called procedure runs, and then control returns to the next line of code after the called procedure in the original procedure.

If your code is running and you need to break, press Ctrl+Break. This feature is useful when you find yourself in an infinite loop.

Use the Immediate Window

The Immediate window is useful when you want to evaluate expressions, find out the value of a variable, or quickly test a procedure. You can open the Immediate window by pressing Ctrl+G.

You can print values to the Immediate window by placing a `Debug.Print` command in your code. When VBA executes the `Debug.Print` command, it prints the value you indicate to the Immediate window. For example, if you place `Debug.Print X` in your code, and then you step through your code, when VBA executes the `Debug.Print X` command, the value of the variable X appears in the Immediate window.

You can use the Immediate window to return a value. Use the `Print` statement or a question mark (`?`) to return the value of a variable or expression. For example, if you want to display the value of the variable X, you can go to the Immediate window and type:

```
Print X
```

or

```
? X
```

You can also use the Immediate window to execute commands. Type the command in the Immediate window. As soon as you press Enter, VBA executes the command. When using the Immediate window, control statements must appear on a single line. For example, you would use the following code for a `For Next` loop:

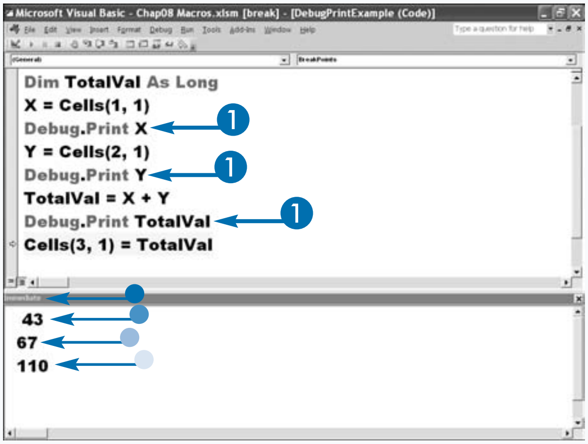
```
For J = 1 to 4: Print J: Next J
```

Use the Immediate Window

USE DEBUG PRINT

1. Add the `Debug Print` command to your code.
2. Click View ➪ Immediate Window, or press Ctrl+G.
   - The Immediate window appears.
3. Press F8 to step through your code.

   As you step through your code, the values you requested with the `Debug Print` command appear in the Immediate window.
   - The X value.
   - The Y value.
   - The TotalVal value.

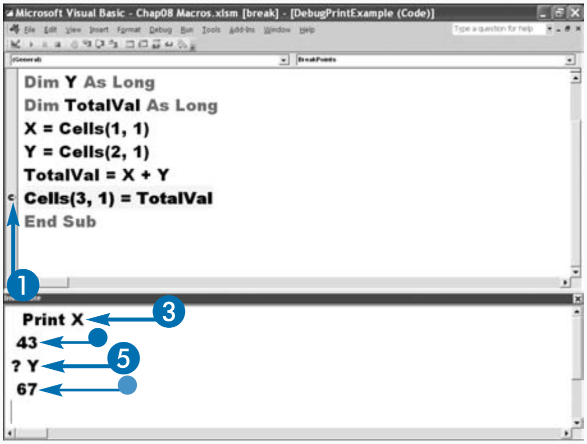

Microsoft Visual Basic - Chap08 Macros.xlsm [break] - [DebugPrintExample (Code)]
(General)
BreakPoints
1
1
1

```
Dim TotalVal As Long
X = Cells(1, 1)
Debug.Print X
Y = Cells(2, 1)
Debug.Print Y
TotalVal = X + Y
Debug.Print TotalVal
Cells(3, 1) = TotalVal
```

```
43
67
110
```

USE PRINT

1. Create a break point.
2. Press F5 to run your code.
3. Type **Print** followed by the variable you want to retrieve.
4. Press Enter.
   - The Immediate window retrieves the value.
5. Type **?** followed by the value you want to retrieve.
   - The Immediate window retrieves the value.


Microsoft Visual Basic - Chap08 Macros.xlsm [break] - [DebugPrintExample (Code)]
(General)
BreakPoints
1
3
5

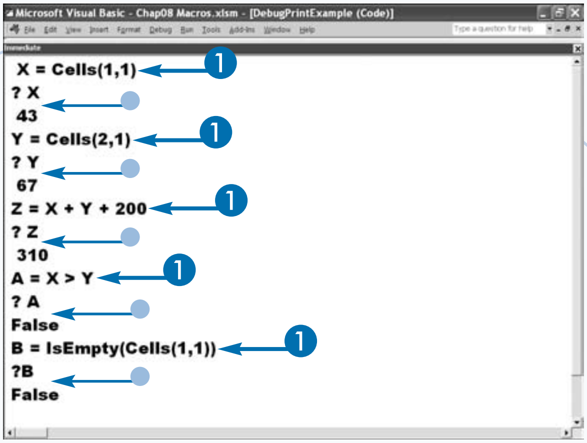
```
Dim Y As Long
Dim TotalVal As Long
X = Cells(1, 1)
Y = Cells(2, 1)
TotalVal = X + Y
Cells(3, 1) = TotalVal
End Sub
```

```
Print X
43
? Y
67
```

EVALUATE AN EXPRESSION

1. Type your expressions.

- The Immediate window evaluates the expressions.


Microsoft Visual Basic - Chap08 Macros.xlsm - [DebugPrintExample (Code)]
Immediate
1
1
1
1
1

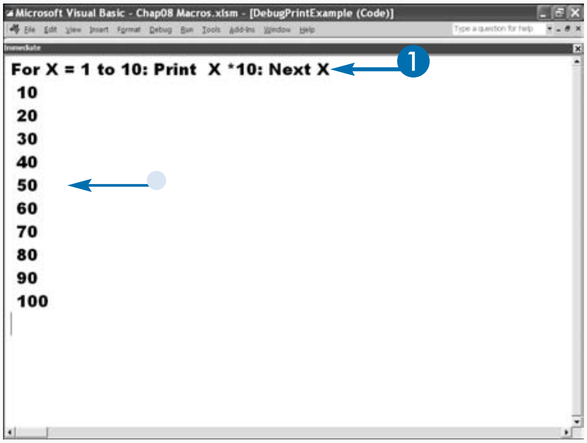
```
X = Cells(1,1)
? X
 43
Y = Cells(2,1)
? Y
 67
Z = X + Y + 200
? Z
 310
A = X > Y
? A
False
B = IsEmpty(Cells(1,1))
?B
False
```

EVALUATE A FOR NEXT LOOP

1. Type your `For Next` loop.

   All of the statements must be on one line.

- The results appear in the Immediate window.


Microsoft Visual Basic - Chap08 Macros.xlsm - [DebugPrintExample (Code)]
Immediate
1

```
For X = 1 to 10: Print  X *10: Next X
 10
 20
 30
 40
 50
 60
 70
 80
 90
 100
```

Extra

The VBE has a toolbar you can use when debugging your code. To view the toolbar, click View ➪ Toolbars ➪ Debug. The toolbar appears below the menu. The following table lists the functions the buttons on the toolbar perform.

BUTTON	FUNCTION
▶	RunSub/Userform
⏸	Break
■	Reset
✋	Toggle Breakpoint
	Step Into
	Step Over
	Step Out
	Open Locals Window
	Open Immediate Window
	Open Watches Window
	Open Quick Watch

Resume Execution When an Error Is Encountered

A *run-time error* is an error that occurs when your code attempts to perform an invalid operation, such as trying to access a value that does not exist. If you do not provide a way for VBA to handle run-time errors, when VBA encounters them, it stops running your code and displays an error message to the user, or it acts in an unpredictable way.

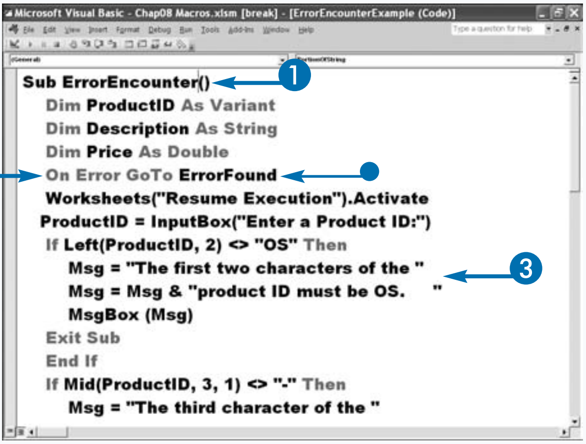
VBA has special code you can use to handle run-time errors. You can instruct VBA to continue the execution of a procedure when it encounters an error by using the `On Error GoTo` statement. The following is the syntax for the `On Error GoTo` command:

`On Error GoTo` *`label`*

When you use this command, control jumps to a labeled section of code whenever VBA encounters a run-time error. A label is a text string followed by a colon. The `On Error GoTo` command moves to the label, thereby passing control from the current location in the procedure to the label. Usually, you place your labeled code at the end of your procedure. For example, you can use `ErrorFound:` as a label for the code you want to run if VBA encounters an error.

An `Exit Sub` or `Exit Function` statement causes VBA to end the execution of your procedure. You can place an Exit Sub or Exit Function statement prior to the labeled section of your code to keep the procedure from executing the labeled code when VBA does not encounter an error.

Resume Execution When an Error Is Encountered


Microsoft Visual Basic - Chap08 Macros.xlsm [break] - [ErrorEncounterExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Type a question for help
(General)
PortionOfString
1
2
●
3

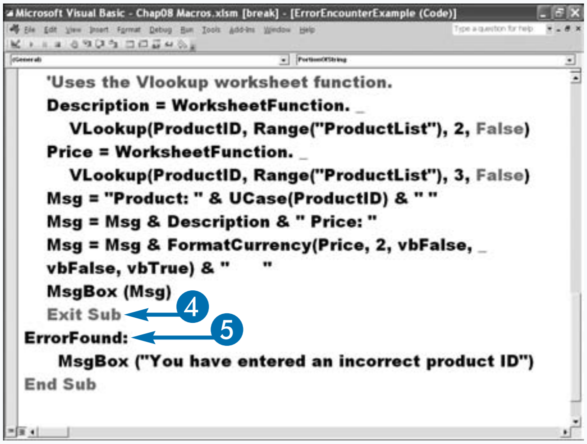
```
Sub ErrorEncounter()
    Dim ProductID As Variant
    Dim Description As String
    Dim Price As Double
    On Error GoTo ErrorFound
    Worksheets("Resume Execution").Activate
   ProductID = InputBox("Enter a Product ID:")
    If Left(ProductID, 2) <> "OS" Then
        Msg = "The first two characters of the "
        Msg = Msg & "product ID must be OS.     "
        MsgBox (Msg)
    Exit Sub
    End If
    If Mid(ProductID, 3, 1) <> "-" Then
        Msg = "The third character of the "
```

① Name your procedure.

② Type your `On Error GoTo` command.

- This is the label.

③ Type the VBA code for the procedure.


Microsoft Visual Basic - Chap08 Macros.xlsm [break] - [ErrorEncounterExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Type a question for help
(General)
PortionOfString
4
5

```
    'Uses the Vlookup worksheet function.
    Description = WorksheetFunction. _
        VLookup(ProductID, Range("ProductList"), 2, False)
    Price = WorksheetFunction. _
        VLookup(ProductID, Range("ProductList"), 3, False)
    Msg = "Product: " & UCase(ProductID) & " "
    Msg = Msg & Description & " Price: "
    Msg = Msg & FormatCurrency(Price, 2, vbFalse, _
    vbFalse, vbTrue) & "      "
    MsgBox (Msg)
    Exit Sub
ErrorFound:
      MsgBox ("You have entered an incorrect product ID")
End Sub
```

④ Type **Exit Sub** at the end of the main procedure code.

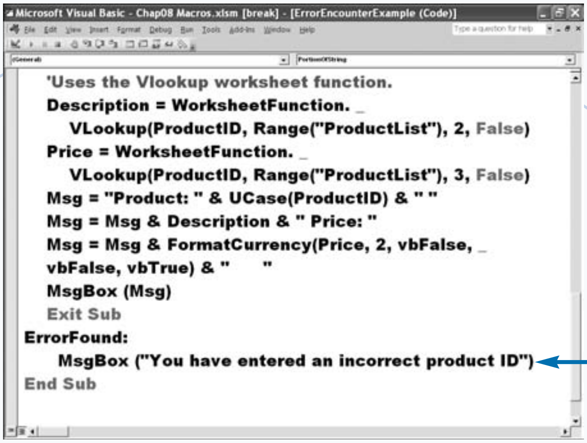
The Exit Sub statement causes the procedure to exit without running the error code.

⑤ Create a label.

VBA moves to the label when a run-time error occurs.

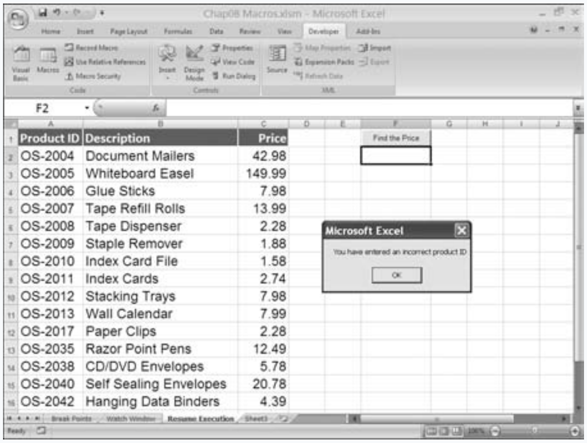
6. Type the VBA code to execute when an error occurs.

7. Press Alt+F11 to switch from the VBE to Excel, and then run the macro.


Microsoft Visual Basic - Chap08 Macros.xlsm [break] - [ErrorEncounterExample (Code)]
(General)
6

```
    'Uses the Vlookup worksheet function.
    Description = WorksheetFunction. _
      VLookup(ProductID, Range("ProductList"), 2, False)
    Price = WorksheetFunction. _
      VLookup(ProductID, Range("ProductList"), 3, False)
    Msg = "Product: " & UCase(ProductID) & " "
    Msg = Msg & Description & " Price: "
    Msg = Msg & FormatCurrency(Price, 2, vbFalse, _
    vbFalse, vbTrue) & "     "
    MsgBox (Msg)
    Exit Sub
ErrorFound:
     MsgBox ("You have entered an incorrect product ID")
End Sub
```

If a run-time error occurs, the appropriate VBA code executes.


Chap08 Macros.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Visual Basic
Macros
Record Macro
Use Relative References
Macro Security
Insert
Design Mode
Properties
View Code
Run Dialog
Source
Import
Expansion Packs
Refresh Data
F2
Find the Price
Microsoft Excel
OK
Ready

Product ID	Description	Price
OS-2004	Document Mailers	42.98
OS-2005	Whiteboard Easel	149.99
OS-2006	Glue Sticks	7.98
OS-2007	Tape Refill Rolls	13.99
OS-2008	Tape Dispenser	2.28
OS-2009	Staple Remover	1.88
OS-2010	Index Card File	1.58
OS-2011	Index Cards	2.74
OS-2012	Stacking Trays	7.98
OS-2013	Wall Calendar	7.99
OS-2017	Paper Clips	2.28
OS-2035	Razor Point Pens	12.49
OS-2038	CD/DVD Envelopes	5.78
OS-2040	Self Sealing Envelopes	20.78
OS-2042	Hanging Data Binders	4.39

You have entered an incorrect product ID

Extra

If you place a `Resume` statement at the end of your labeled code, control returns to the line of code that caused the run-time error, and the line of code executes again. If the code produces an error, the error-handling code executes again. This option enables you to recheck for the error.

If you place a `Resume Next` statement at the end of your labeled code, control returns to the next line of code in the procedure after the location that produced the run-time error. Your code continues execution without the line of code that produced the error. This option enables you to complete the procedure.

If you place a `Resume Label` statement followed by a label name at the end of your block of code, you can transfer control to the labeled line of code.

Process a Run-Time Error

Whenever VBA encounters a run-time error, it places the error information, which includes an error code and description, in the `Err` object. You can use this information to correct the error.

To capture the error without halting the execution of your code, you can place the `On Error Resume Next` statement immediately after the `Sub` statement for your procedure. This statement instructs VBA to capture the error and continue processing.

The `Err.Number` property contains the most recent run-time error code. The error codes for run-time error are always numbers. Essentially, if the `Err.Number` property has a value greater than zero, then an error has occurred. You can quickly check to see if an error exists by checking the `Number` property of the `Err` object. If an error exists, you can use `If Then` statements or `Case` statements to respond to the error, as in the following code: `If Err.Number = 13 Then.`

You can design your error-processing code to react to the specific run-time error encountered. For example, if the `Err.Number` property has a value of 13, the value passed to a variable is not the correct data type; the user may have entered a string for a variable that requires a number. You can write code that examines the run-time error and prompts the user for the correct data type.

If you want to see the error description, use the `Err.Description` property. The following code creates a Division by Zero error and then displays the error number and code in a message box:

```
On Error Resume Next
X = 1/0

MsgBox (Err.Number & " " & Err.Description)
```

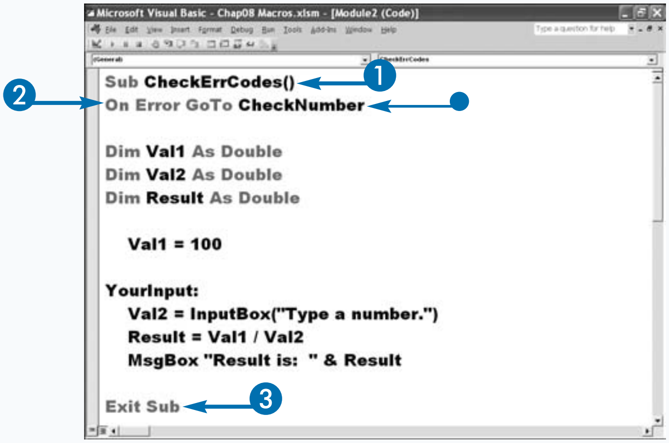
Process a Run-Time Error

① Name your procedure.

② Type the `On Error GoTo` command.

- This is the label.

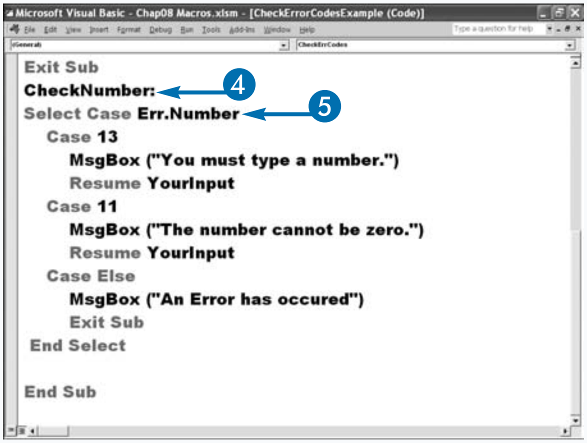
③ Type **Exit Sub** at the end of the main body of code.


Microsoft Visual Basic - Chap08 Macros.xlsm - [Module2 (Code)]
(General)
CheckErrCodes
1
2
3

```
Sub CheckErrCodes()
On Error GoTo CheckNumber

Dim Val1 As Double
Dim Val2 As Double
Dim Result As Double

    Val1 = 100

YourInput:
    Val2 = InputBox("Type a number.")
    Result = Val1 / Val2
    MsgBox "Result is:  " & Result

Exit Sub
```

④ Create a label.

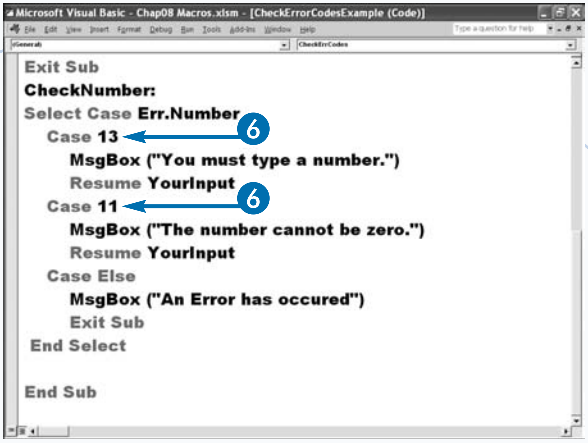
⑤ Create a conditional statement to check the value of the `Err.Number` object property.


Microsoft Visual Basic - Chap08 Macros.xlsm - [CheckErrorCodesExample (Code)]
(General)
CheckErrCodes
4
5

```
Exit Sub
CheckNumber:
Select Case Err.Number
    Case 13
        MsgBox ("You must type a number.")
        Resume YourInput
    Case 11
        MsgBox ("The number cannot be zero.")
        Resume YourInput
    Case Else
        MsgBox ("An Error has occured")
        Exit Sub
 End Select

End Sub
```

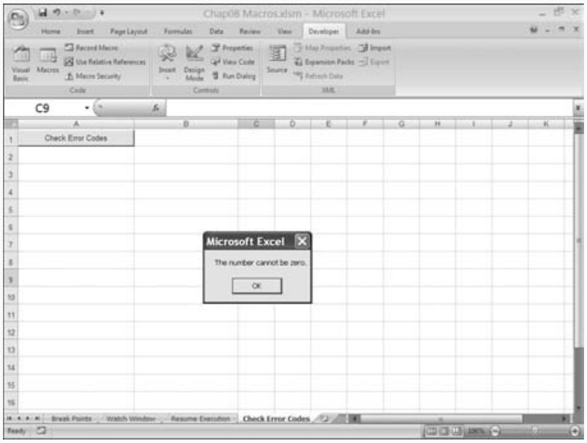
⑥ Type the code to execute if a specific error occurs.

⑦ Press Alt+F11 to switch from the VBE to Excel, and then run the macro.


Microsoft Visual Basic - Chap08 Macros.xlsm - [CheckErrorCodesExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
CheckErrCodes
6
6

```
Exit Sub
CheckNumber:
Select Case Err.Number
    Case 13
        MsgBox ("You must type a number.")
        Resume YourInput
    Case 11
        MsgBox ("The number cannot be zero.")
        Resume YourInput
    Case Else
        MsgBox ("An Error has occured")
        Exit Sub
 End Select

End Sub
```

If a run-time error occurs, the appropriate VBA code executes.


Chap08 Macros.xlsm - Microsoft Excel
Home Insert Page Layout Formulas Data Review View Developer Add-Ins
C9
Check Error Codes
Microsoft Excel
OK
Break Points Watch Window Resume Execution Check Error Codes
Ready

The number cannot be zero.

Extra

The following table lists some of the most common errors that VBA returns when it encounters a run-time error. Each error code has a description message you can display using the `Err.Description` property. You can also capture the code and display your own custom messages.

CODE	ERROR	REASON
3	Return without GoSub	The Return statement exists without a corresponding GoSub statement.
5	Invalid procedure call	The call to another procedure or function cannot be made. This is usually due to a problem with the arguments; either not calling with a valid number of arguments, or the value of an argument is not valid for the procedure.
9	Subscript out of range	An attempt was made to access an array element that does not exist.
10	The array is fixed or temporarily locked	This occurs when you try to redimension a fixed length array.
11	Division by zero	This occurs when the divisor is zero.
13	Type mismatch	The value passed to a variable is not the correct data type.
35	Sub, Function, or Property not defined	This occurs when you attempt to call a procedure, function, or property that does not exist.

Open a Workbook

You can use the `Open` method with the `WorkBooks` object to open a workbook. This is similar to clicking the Office button and using the menu to open a workbook. Each time you open a new workbook, Excel adds the workbook to the Workbooks collection.

The `Open` method has 16 parameters. This section discusses the `FileName`, `WriteResPassword`, `Password`, `ReadOnly`, `IgnoreReadOnlyRecommended`, and `AddToMru` parameters. Refer to VBA help for a discussion of the remaining parameters.

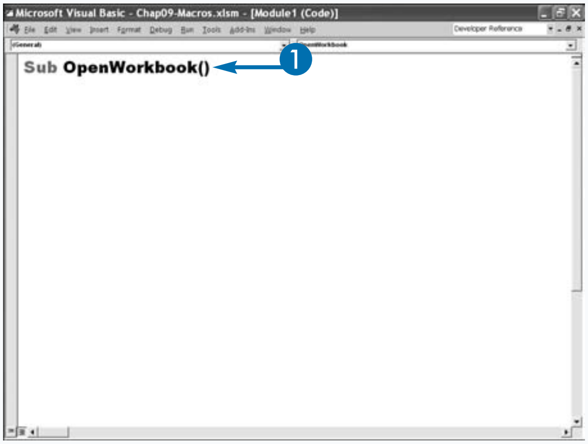
Use the `FileName` parameter to tell VBA the workbook you want to open. You can use the name of the workbook if the workbook is located in the current folder. If the workbook is located in another folder, enter the path to the workbook. You must enclose the workbook name or path in quotes.

If you want the user to enter a password before they can modify the workbook, set the `WriteResPassword` parameter to the password you want them to enter. If you want the user to enter a password before they can open a protected workbook, set the `Password` parameter to the password you want them to enter.

Set the `ReadOnly` parameter to `True` to make a workbook Read-Only. If the workbook is Read-Only Recommended, Excel prompts users to open the file as Read-Only each time the workbook opens. To eliminate the prompt, set the `IgnoreReadOnlyRecommended` parameter to `True`.

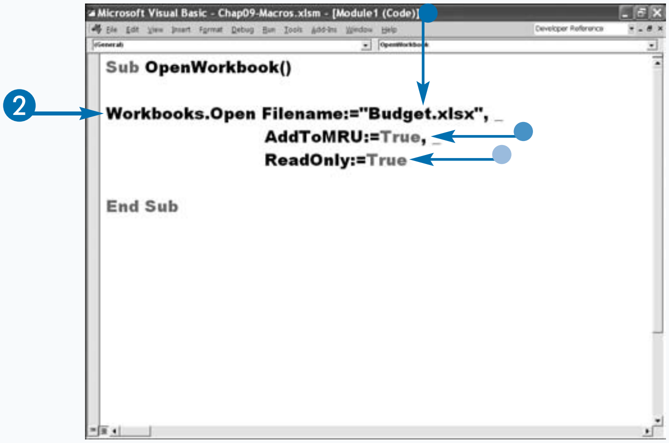
Set the `AddToMru` parameter to `True` to add the workbook to the Recent Documents list.

Open a Workbook


Microsoft Visual Basic - Chap09-Macros.xlsm - [Module1 (Code)]
1

```
Sub OpenWorkbook()
```

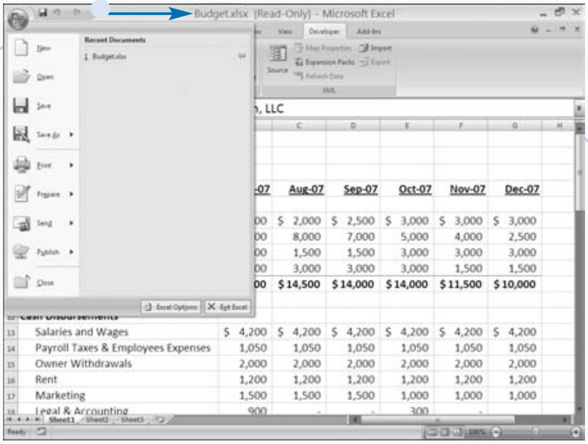
1. Name your procedure.


Microsoft Visual Basic - Chap09-Macros.xlsm - [Module1 (Code)]
2

```
Sub OpenWorkbook()

Workbooks.Open Filename:="Budget.xlsx", _
               AddToMRU:=True, _
               ReadOnly:=True

End Sub
```

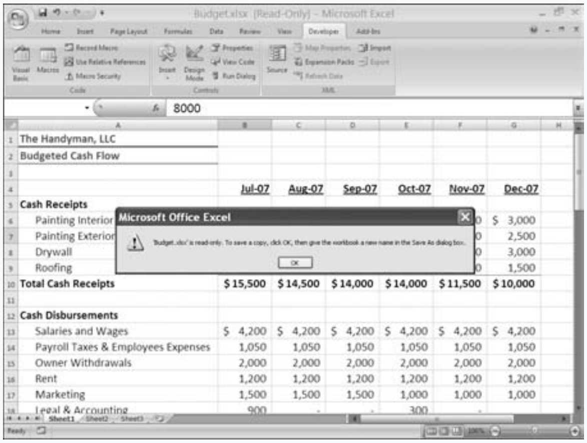
2. Create your `Open` command.
   - The workbook you want to open.
   - Adds the file to the Recent Documents list.
   - Sets the file to Read-Only.
3. Press Alt+F11 to switch from the VBE to Excel, and run the macro.

- The macro opens the file and adds the filename to the Recent Documents list.


Budget.xlsx [Read-Only] - Microsoft Excel
New
Open
Save
Save As
Print
Prepare
Send
Publish
Close
Recent Documents
1 Budget.xlsx
Excel Options
Exit Excel
View
Developer
Add-Ins
Source
Map Properties
Import
Expansion Packs
Export
Refresh Data
XML
Sheet1
Sheet2
Sheet3
Ready
100%

	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07
	$ 2,000	$ 2,500	$ 3,000	$ 3,000	$ 3,000
	8,000	7,000	5,000	4,000	2,500
	1,500	1,500	3,000	3,000	3,000
	3,000	3,000	3,000	1,500	1,500
	$ 14,500	$ 14,000	$ 14,000	$ 11,500	$ 10,000
Salaries and Wages	$ 4,200	$ 4,200	$ 4,200	$ 4,200	$ 4,200
Payroll Taxes & Employees Expenses	1,050	1,050	1,050	1,050	1,050
Owner Withdrawals	2,000	2,000	2,000	2,000	2,000
Rent	1,200	1,200	1,200	1,200	1,200
Marketing	1,500	1,500	1,000	1,000	1,000

If users try to make a change and save the file, Excel warns that the file is Read-Only.


Budget.xlsx [Read-Only] - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Visual Basic
Macros
Record Macro
Use Relative References
Macro Security
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Import
Expansion Packs
Export
Refresh Data
XML
Sheet1
Sheet2
Sheet3
Ready
100%

8000

	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07
The Handyman, LLC						
Budgeted Cash Flow						
Cash Receipts						
Painting Interior						$ 3,000
Painting Exterior						2,500
Drywall						3,000
Roofing						1,500
Total Cash Receipts	$ 15,500	$ 14,500	$ 14,000	$ 14,000	$ 11,500	$ 10,000
Cash Disbursements						
Salaries and Wages	$ 4,200	$ 4,200	$ 4,200	$ 4,200	$ 4,200	$ 4,200
Payroll Taxes & Employees Expenses	1,050	1,050	1,050	1,050	1,050	1,050
Owner Withdrawals	2,000	2,000	2,000	2,000	2,000	2,000
Rent	1,200	1,200	1,200	1,200	1,200	1,200
Marketing	1,500	1,500	1,500	1,000	1,000	1,000

Microsoft Office Excel

'Budget.xlsx' is read-only. To save a copy, click OK, then give the workbook a new name in the Save As dialog box.

OK

Extra

When working in Excel, use the Save As dialog box to set a password for your file, set your file to Read-Only Recommended, or set your file to Read-Only. To open the Save As dialog box, click the Office button, click Save As, and then click any Save As option. The Save As dialog box appears. In the lower-left corner of the Save As dialog box, click the Tools button. The Tools menu appears. Click General Options. The General Options dialog box appears. Enter a password in the Password to Open or Password to Modify field to password-protect your file. Select the Read-Only Recommended option to set your file to Read-Only Recommended. Click OK to close the dialog box. To make your file Read-Only, click Properties on the Tools menu. The Properties dialog box appears. Click the General tab and then select the Read-Only attribute.

Open a Text File as a Workbook

Many software applications have an option for exporting the application's data to a text file. You can use VBA's `OpenText` method with the Workbooks object to import a text file. You can then use all of Excel's data-analysis capabilities to analyze the file. With the `OpenText` method, Excel opens the text file as a single worksheet in a new workbook. The file remains a text file. Users can modify it and save it as a text file or as an Excel worksheet.

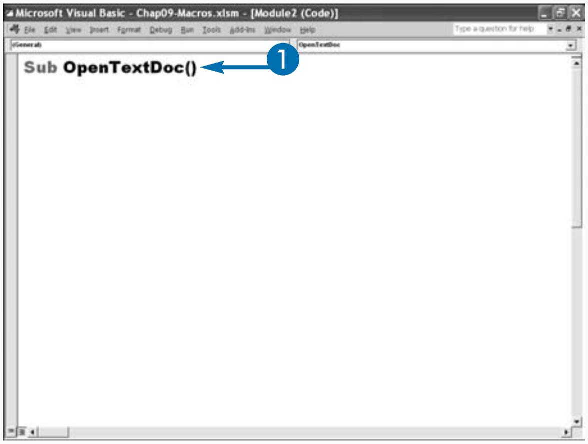
The list of parameters for the `OpenText` method is extensive. Only the `FileName` parameter is required. You use the `FileName` parameter to tell VBA the name of the file to open. You can enter the name of a file as the parameter if the workbook is located in the current folder. If the file is located in another folder, enter the path to the file. Make sure you enclose the path statement in quotes.

The `OpenText` method can handle any delimited or fixed-width file. A delimited file uses a comma, space, semicolon, tab, or other character to mark the end of each column. A fixed-width file aligns the columns and gives each column a defined width. Use the `DataType` parameter to tell VBA whether your file is a delimited file or a fixed-width file. Use the constant `xlDelimited` for delimited files, and the constant `xlFixedWidth` for fixed-width files.

If your file is delimited, you can tell VBA what the delimiter is. For example, if the delimiter is a comma, then you set the `Comma` parameter to `True`.

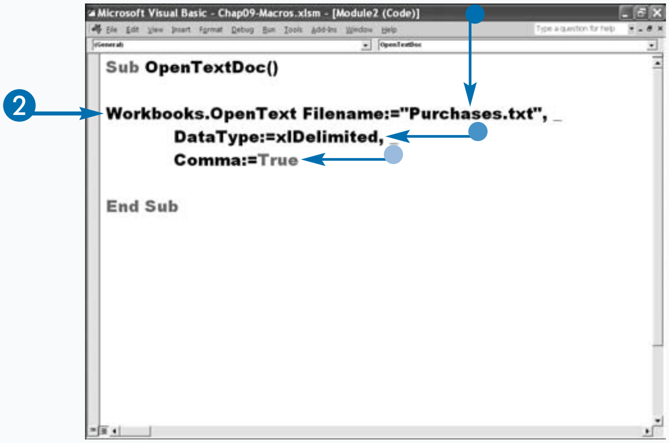
Open a Text File as a Workbook

1. Name your procedure.


Microsoft Visual Basic - Chap09-Macros.xlsm - [Module2 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
OpenTextDoc
1

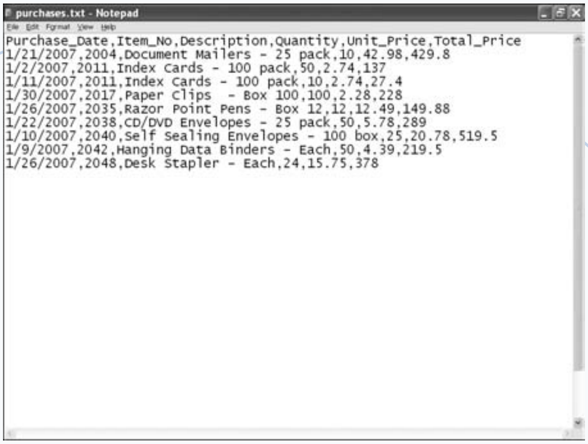
```
Sub OpenTextDoc()
```

2. Create your `OpenText` command.
   - The file you want to open.
   - The file type.
   - The delimiter.
3. Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap09-Macros.xlsm - [Module2 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
OpenTextDoc
2

```
Sub OpenTextDoc()

Workbooks.OpenText Filename:="Purchases.txt", _
        DataType:=xlDelimited,
        Comma:=True

End Sub
```

The text file appears.

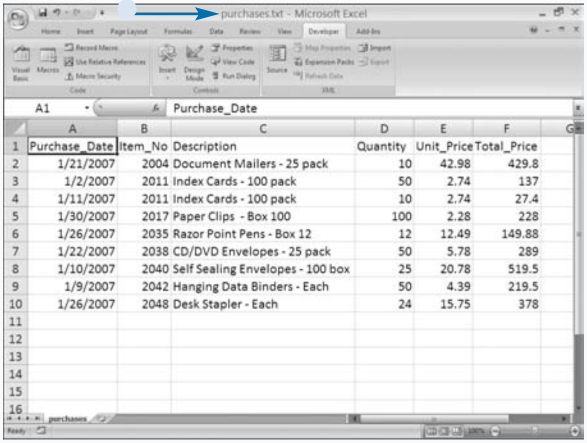


```
Purchase_Date,Item_No,Description,Quantity,Unit_Price,Total_Price
1/21/2007,2004,Document Mailers - 25 pack,10,42.98,429.8
1/2/2007,2011,Index Cards - 100 pack,50,2.74,137
1/11/2007,2011,Index Cards - 100 pack,10,2.74,27.4
1/30/2007,2017,Paper Clips  - Box 100,100,2.28,228
1/26/2007,2035,Razor Point Pens - Box 12,12,12.49,149.88
1/22/2007,2038,CD/DVD Envelopes - 25 pack,50,5.78,289
1/10/2007,2040,Self Sealing Envelopes - 100 box,25,20.78,519.5
1/9/2007,2042,Hanging Data Binders - Each,50,4.39,219.5
1/26/2007,2048,Desk Stapler - Each,24,15.75,378
```

You can open the file in Excel.

- The macro opens the text file as a worksheet in Excel.

The file remains a text file.



	A	B	C	D	E	F
1	Purchase_Date	Item_No	Description	Quantity	Unit_Price	Total_Price
2	1/21/2007	2004	Document Mailers - 25 pack	10	42.98	429.8
3	1/2/2007	2011	Index Cards - 100 pack	50	2.74	137
4	1/11/2007	2011	Index Cards - 100 pack	10	2.74	27.4
5	1/30/2007	2017	Paper Clips - Box 100	100	2.28	228
6	1/26/2007	2035	Razor Point Pens - Box 12	12	12.49	149.88
7	1/22/2007	2038	CD/DVD Envelopes - 25 pack	50	5.78	289
8	1/10/2007	2040	Self Sealing Envelopes - 100 box	25	20.78	519.5
9	1/9/2007	2042	Hanging Data Binders - Each	50	4.39	219.5
10	1/26/2007	2048	Desk Stapler - Each	24	15.75	378

Extra

Use the following parameters with the `OpenText` method to open a text file in a workbook.

PARAMETERS	DESCRIPTION
`FileName`	The name and location of the text file.
`Origin`	Indicates the original file platform: `xlMacintosh` or `xlWindows`
`StartRow`	The first row to import.
`DataType`	The format of the text file, either `xlFixedWidth` or `xlDelimited`.
`TextQualifier`	The character that identifies text.
`ConsecutiveDelimiter`	Type **True** to treat consecutive delimiters as one delimiter.
`Tab`, `Semicolon`, `Comma`, `Space`	Set each of these parameters to `True` if they are a delimiter.
`Other`	Set to `True` to specify the delimiter.
`OtherChar`	If Other is set to `True`, use this parameter to specify the character to use as a delimiter.
`FieldInfo`	The column number followed by an `XlColumnDataType` constant.
`DecimalSeparator`	The character VBA recognizes as a decimal separator.
`ThousandsSeparator`	The character VBA recognizes as a thousands separator.
`TrailingMinusNumbers`	Set to `True` to designate trailing minus signs as negative numbers.
`Local`	Set to `True` to use the computer's regional settings.

Open a File Requested by the User

You can retrieve the name of the file a user wants to open by prompting the user with an Open dialog box and then using a method to open the file.

To display an Open dialog box from an Excel procedure, use the `GetOpenFilename` method. This method does not open the file when the user clicks OK. Instead, the method passes the name of the file the user selects to a variable you assign to the statement. If you want to open the selected file, you must use a method. If the user does not select a file, the statement returns `False`.

The `GetOpenFilename` has several optional parameters. The `FileFilter` parameter lets users select the type of file they want to open. You can create a list of values for the Files of Type drop-down menu in the Open dialog box. For example, `"XML Files (*.xml), *.xml"` tells VBA that Excel should only open XML files. You can specify multiple file types if you separate the file types with commas. Users can then select the file type they want to use.

Use the `FilterIndex` parameter to indicate the default `FileFilter` option. You specify a filter value between 1 and the number of filters you selected. If you omit this parameter, VBA uses the first filter specified as the default value.

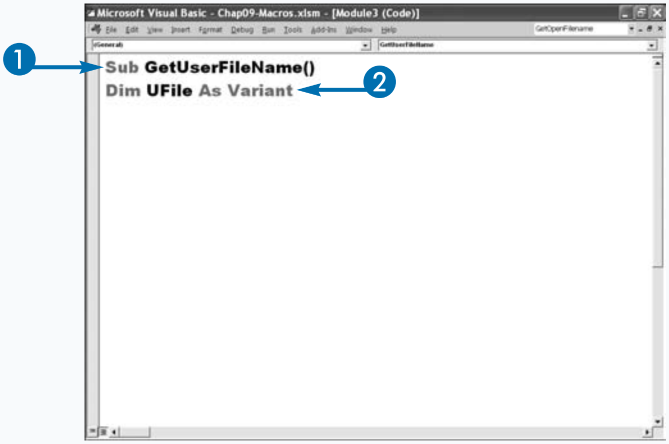
Use the `Title` parameter to place a title on your dialog box. For example, for a dialog box that opens text files, you can change the title of the dialog box to "Open Text Files".

To enable users to select and open multiple files at once, set the `MultiSelect` parameter to `True`.

Open a File Requested by the User

① Name your procedure.

② Create a variable to store the filename returned by the `GetOpenFilename` method.


Microsoft Visual Basic - Chap09-Macros.xlsm - [Module3 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
GetOpenFilename
(General)
GetUserFileName
1
2

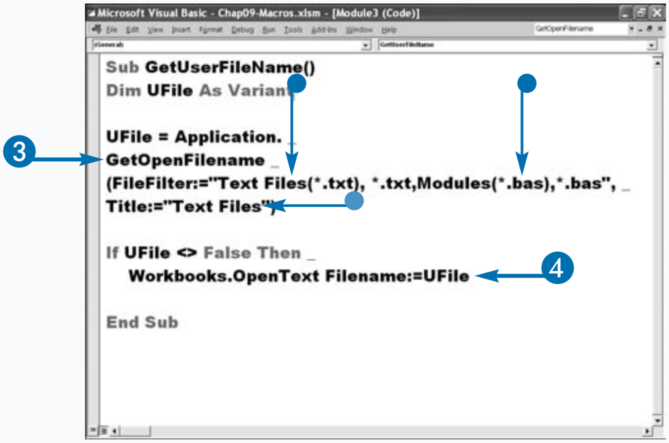
```
Sub GetUserFileName()
Dim UFile As Variant
```

③ Create your `GetOpenFilename` command.

- Types of files the user can open.
- The title of the Open dialog box.

④ Create a command to open the workbook.

⑤ Press Alt+F11 to switch from the VBE to Excel, and run the macro.

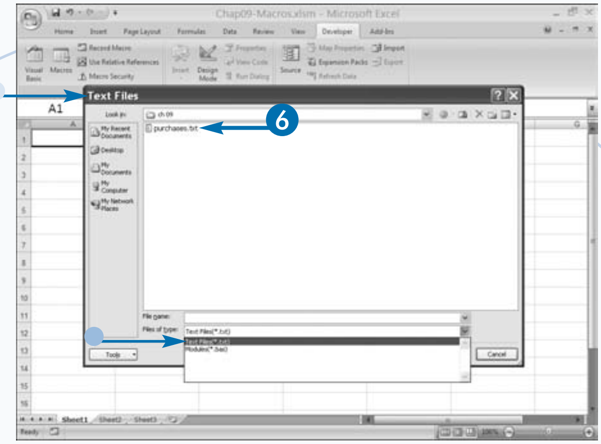

Microsoft Visual Basic - Chap09-Macros.xlsm - [Module3 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
GetOpenFilename
(General)
GetUserFileName
3
4

```
Sub GetUserFileName()
Dim UFile As Variant

UFile = Application. _
GetOpenFilename _
(FileFilter:="Text Files(*.txt), *.txt,Modules(*.bas),*.bas", _
Title:="Text Files")

If UFile <> False Then _
   Workbooks.OpenText Filename:=UFile

End Sub
```

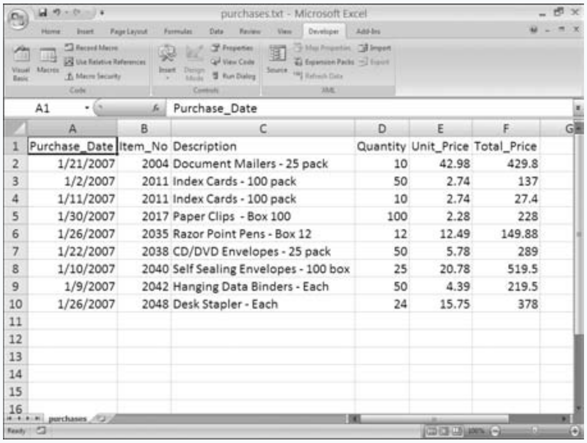
The macro opens the Open dialog box.

- The list of file types the user can open.
- The title of the dialog box.

6 Double-click the file you want to open.



The macro opens the file.


purchases.txt - Microsoft Excel

A1 Purchase_Date

	A	B	C	D	E	F
1	Purchase_Date	Item_No	Description	Quantity	Unit_Price	Total_Price
2	1/21/2007	2004	Document Mailers - 25 pack	10	42.98	429.8
3	1/2/2007	2011	Index Cards - 100 pack	50	2.74	137
4	1/11/2007	2011	Index Cards - 100 pack	10	2.74	27.4
5	1/30/2007	2017	Paper Clips - Box 100	100	2.28	228
6	1/26/2007	2035	Razor Point Pens - Box 12	12	12.49	149.88
7	1/22/2007	2038	CD/DVD Envelopes - 25 pack	50	5.78	289
8	1/10/2007	2040	Self Sealing Envelopes - 100 box	25	20.78	519.5
9	1/9/2007	2042	Hanging Data Binders - Each	50	4.39	219.5
10	1/26/2007	2048	Desk Stapler - Each	24	15.75	378

Extra

The `FileFilter` parameter enables you to create a list of files users can select in the `Open` dialog box. You describe the file and follow the description with a comma and a wildcard file specification. If you do not set this parameter, VBA lists all of the file types Excel can open.

Example:

```
Text Files (*.text), *.txt
```

An asterisk (*) is a wildcard character that represents any string of characters, and a question mark (?) is a wildcard character that represents a single character. The notation *.txt means any filename that ends with .txt.

FILE TYPE	DESCRIPTION
*.txt, *.prn, *.csv	Text files
*.xls, *.xlm, *.xl, *.xlc, *.xlsx, *.xlsm	Microsoft Excel files
*.htm	Web pages
*.xml	XML files
*.odc, *.udl, *.dsn	Data sources
*.mdb, *.mde	Access databases
*.wk?	Lotus files
*.wks	Microsoft Works 2.0 files
*.dbf	dBase files

Save a Workbook

To save an Excel workbook, you can use the `Save` or `SaveAs` method of the Workbook object. VBA creates a workbook object for each workbook you open. You can reference a specific workbook object by name. For example, `Workbooks("Sample.xlsx")` refers to the `Sample.xlsx` workbook.

If you do not know the name of the workbook you want to save, you can make the workbook you want to save the active workbook, and then use the `ActiveWorkbook` property to save the workbook. For example, the code `ActiveWorkbook.Save` saves the active workbook.

If the workbook you want to save contains the macro that is currently running, you can use the `ThisWorkbook` property. For example, the code `ThisWorkbook.Save` saves the workbook in which the macro is located. The workbook that contains the macro is often the active workbook. However, if you open a new workbook during the execution of a macro, the new workbook can become the active workbook.

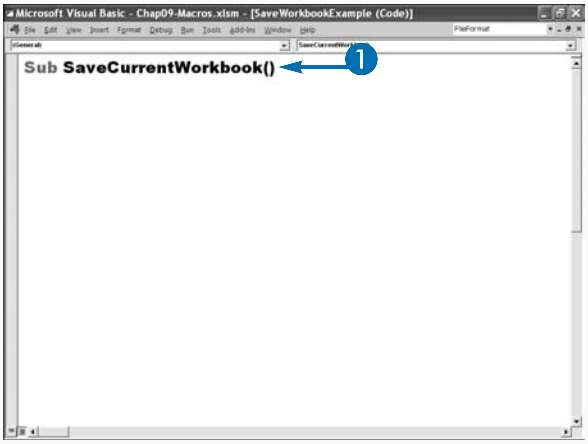
To set save specifications for a workbook, use the `Workbook.SaveAs` method, which has the following parameters: `FileName`, `FileFormat`, `Password`, `WriteResPassword`, `ReadOnlyRecommended`, `CreateBackup`, `AccessMode`, `ConflictResolution`, `AddToMru`, and `Local`.

Use the `FileName` parameter to specify the filename and the folder in which to save the workbook. If you do not set this parameter, Excel uses the workbook's filename.

Use the `FileFormat` parameter to specify the file format for saving the file. You can use any of the file formats that Excel supports by entering one of the `XlFileFormat` constant values. See Appendix A for a list of the `XlFileFormat` constant values. Set the `AddToMru` parameter to `True` if you want to add the workbook to the Recent Documents list.

Save a Workbook

① Name your procedure.

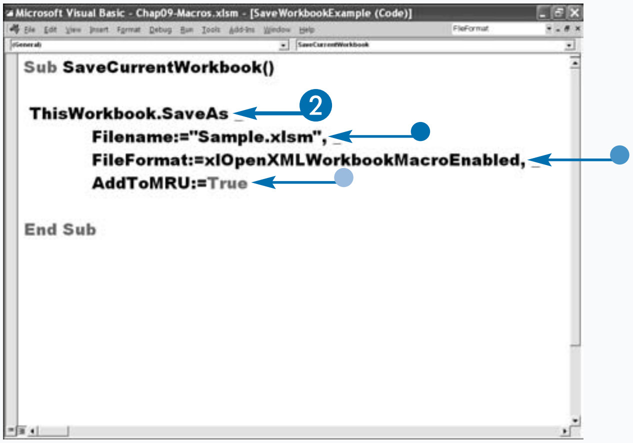

Microsoft Visual Basic - Chap09-Macros.xlsm - [SaveWorkbookExample (Code)]
File
Edit
View
Insert
Format
Debug
Run
Tools
Add-Ins
Window
Help
FileFormat
(General)
SaveCurrentWorkbook
1

```
Sub SaveCurrentWorkbook()
```

② Create your `SaveAs` command.

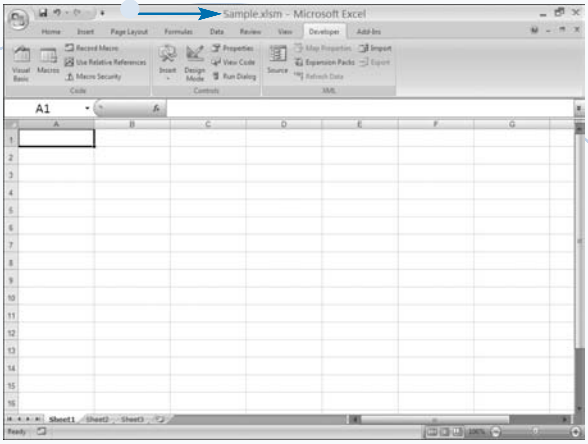
- The name you want to give the saved file.
- The file format.
- Adds the file to the Recent Documents list.

③ Press Alt+F11 to switch from the VBE to Excel, and run the macro.

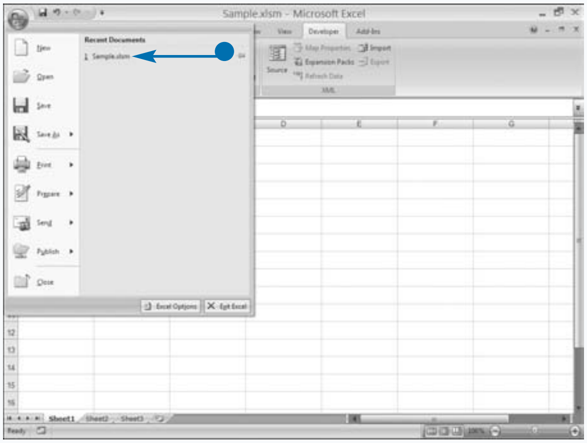

Microsoft Visual Basic - Chap09-Macros.xlsm - [SaveWorkbookExample (Code)]
File
Edit
View
Insert
Format
Debug
Run
Tools
Add-Ins
Window
Help
FileFormat
(General)
SaveCurrentWorkbook
2

```
Sub SaveCurrentWorkbook()

 ThisWorkbook.SaveAs _
         Filename:="Sample.xlsm", _
         FileFormat:=xlOpenXMLWorkbookMacroEnabled, _
         AddToMRU:=True

End Sub
```

- The macro saves your file.


Sample.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
A1
Sheet1
Sheet2
Sheet3
Ready

- The macro adds your file to the Recent Documents list.


Sample.xlsm - Microsoft Excel
Recent Documents
1 Sample.xlsm
New
Open
Save
Save As
Print
Prepare
Send
Publish
Close
Excel Options
Exit Excel
Sheet1
Sheet2
Sheet3
Ready

Extra

The `SaveAs` method has several optional parameters that determine how the file is saved. Remember to use the named parameter option to specify parameter values for the method.

SAVEAS PARAMETER	DESCRIPTION
FileName	Indicates the name and location to save the file.
FileFormat	Contains an `XlFileFormat` constant that indicates the format for saving the file. See Appendix A for a list of `XlFileFormat` constant values.
Password	Contains up to a 15-character password that is required to open the file.
WriteResPassword	Contains the password for write-restricting the file.
ReadOnlyRecommended	Set to `True` to display a message that recommends that the user open the file as Read-Only.
CreateBackup	Set to `True` to create a backup file.
AccessMode	Contains a constant value of xlExclusive, xlNoChange, or xlShared to indicate access mode.
ConflictResolution	Contains a constant indicating how to resolve conflicts. A value of xlUserResolution displays a Conflict Resolution box, xlLocalSessionChanges accepts a local user's changes, and xlOtherSessionChanges accepts changes from other users.
AddToMru	Set to `True` to add a workbook to the Recent Documents list.
Local	Set to `True` to save files in the language used by Excel; set to `False` to save files in the language used by VBA.

Save a Workbook in a Format Specified by the User

You can use the `GetSaveAsFilename` method to request the name, location, and format to use when saving a workbook file. This method displays the Save As dialog box from which the user selects the file they want to save. The `GetSaveAsFilename` method does not save the file; instead, VBA returns the user's information to the variable you assign to the `GetSaveAsFilename` statement. If the user does not make an entry, the variable returns `False`. To save the file, use the `SaveAs` method. See the section, "Save a Workbook," for more information. The `GetSaveAsFilename` method has the following optional parameters: `InitialFilename`, `FileFilter`, `FilterIndex`, and `Title`.

Use the `InitialFilename` parameter to suggest a name for the file. If you do not suggest a name, Excel uses the name of the active workbook. Use the `FileFilter` parameter to create a list of file formats users can use to save the file. If you do not include this parameter, Excel lists all available formats. To create the list, describe the file type, place a comma after the description, and then place a wildcard specification after the comma, for example:

```
Text Files (*.text), *.txt
```

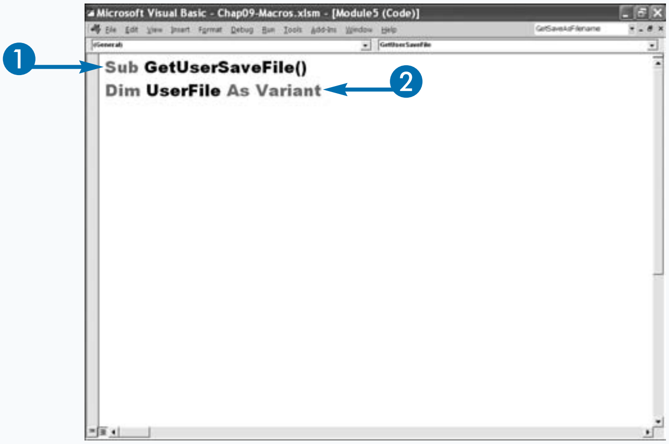
An asterisk (*) is a wildcard character that means any string of characters. The notation *.txt means any file that ends with .txt.

Use the `FilterIndex` parameter to select a default file-filtering option from the `FileFilter` parameter options. You can use a filter value between 1 and the total number of filters. If you omit this parameter, VBA uses the first filter as the default value. Use the `Title` parameter to place a title on the dialog box.

Save a Workbook in a Format Specified by the User

① Name your procedure.

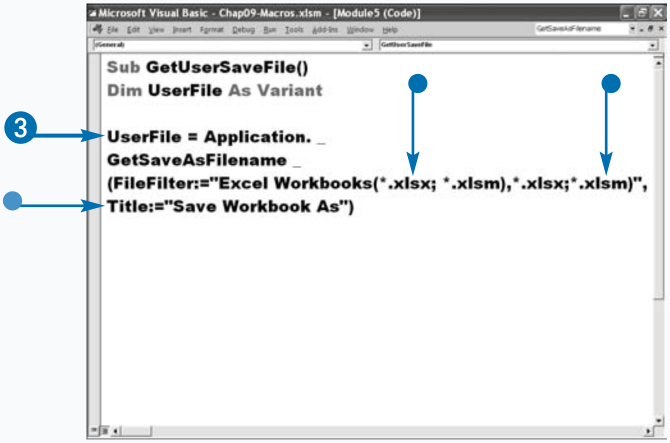
② Declare your variables.


Microsoft Visual Basic - Chap09-Macros.xlsm - [Module5 (Code)]
(General)
GetUserSaveFile
1
2

```
Sub GetUserSaveFile()
Dim UserFile As Variant
```

③ Create a `GetSaveAsFilename` command.

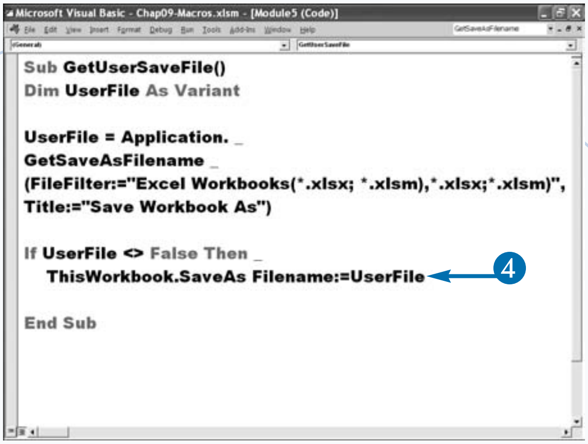
- The filter list.
- The dialog box title.


Microsoft Visual Basic - Chap09-Macros.xlsm - [Module5 (Code)]
(General)
GetUserSaveFile
3

```
Sub GetUserSaveFile()
Dim UserFile As Variant

UserFile = Application. _
GetSaveAsFilename _
(FileFilter:="Excel Workbooks(*.xlsx; *.xlsm),*.xlsx;*.xlsm)",
Title:="Save Workbook As")
```

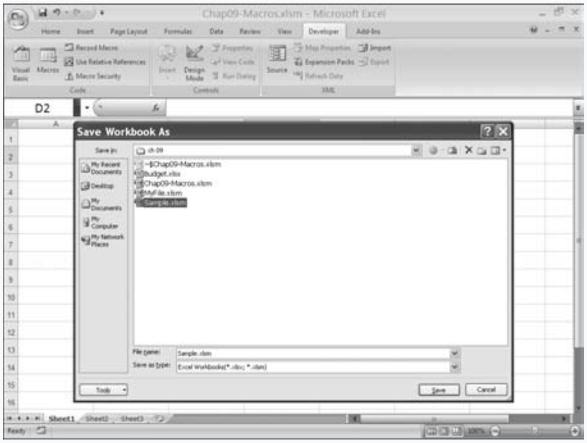
④ Create a command to save the file.

⑤ Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap09-Macros.xlsm - [Module5 (Code)]
(General)
GetUserSaveFile
④

```
Sub GetUserSaveFile()
Dim UserFile As Variant

UserFile = Application. _
GetSaveAsFilename _
(FileFilter:="Excel Workbooks(*.xlsx; *.xlsm),*.xlsx;*.xlsm",
Title:="Save Workbook As")

If UserFile <> False Then _
   ThisWorkbook.SaveAs Filename:=UserFile

End Sub
```

The macro opens the Save Workbook As dialog box and then saves the file you specify.


Chap09-Macros.xlsm - Microsoft Excel
Save Workbook As
Save in: ch 09
~$Chap09-Macros.xlsm
Budget.xlsx
Chap09-Macros.xlsm
MyFile.xlsm
Sample.xlsm
Save
Cancel

File name: Sample.xlsm
Save as type: Excel Workbooks(*.xlsx; *.xlsm)

Extra

Instead of saving an individual workbook, you can save the entire workspace. Saving workspaces enables you to save all open workbooks as a group. When you open a workspace, all of the workbooks open. Workspace files have an .xlw filename extension.

To save a workspace, use the `SaveWorkspace` method of the `Application` object. The `SaveWorkspace` method has one parameter: `FileName`. To save your file in the current folder, enter the name of the file as the `FileName` parameter. To save to another folder, enter the path and the filename as the filename parameter.

Examples:

```
Application.SaveWorkspace("Sample")
Application.SaveWorkspace("C:\Workbooks\Sample")
```

Determine if a Workbook Is Open

The Workbooks collection contains all of the workbooks that are open in Excel. You can determine if a workbook is open by examining the workbooks in the `Workbooks` collection. As a new workbook opens, it becomes a Workbook object and Excel adds it to the `Workbooks` collection. Excel stores workbooks in the Workbooks collection sequentially and assigns each workbook an index value based on its sequence. For example, the first workbook opened is the first workbook in the collection, and VBA assigns it an index value of 1; the next workbook opened is the second workbook, and VBA assigns it an index value of 2. If you know the order in which a workbook opened, you can access the workbook by using the associated index value.

The code `MyWorkbook = Workbook(1).Name` uses the `Name` property to return the name of the first workbook in the collection to the `MyWorkbook` variable. The `Name` property is a read-only property. You can use it to return the name of a workbook, but you cannot use it to change the name of a workbook. To learn how to change the name of a workbook, see the section, "Save a Workbook."

To locate a workbook, look at each workbook in the `Workbooks` collection. With a `For Each Next` loop statement, you can cycle through all open workbooks. See Chapter 6 for more information about using a `For Each Next` loop statement.

Within a looping structure, you can compare the name of each workbook with the name of the desired workbook. With an `If Then` statement, you can check the name of each workbook and then execute a series of statements when the workbook you want is found. See Chapter 6 for more information about using an `If Then` statement.

Determine if a Workbook Is Open

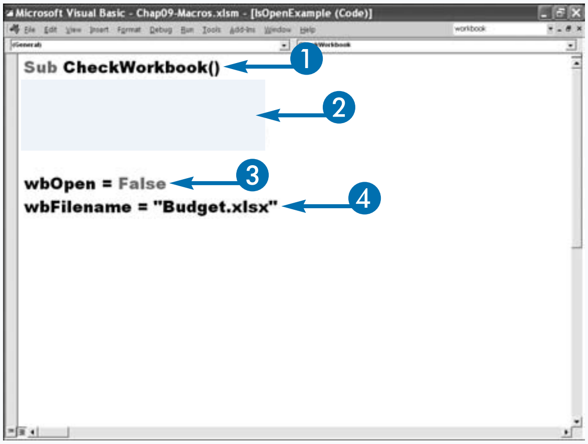
① Name your procedure.

② Declare your variables.

③ Assign `False` to a Boolean variable.

You set this variable to `True` if the active workbook is the workbook that you want to activate.

④ Assign the file you are looking for to a variable.


Microsoft Visual Basic - Chap09-Macros.xlsm - [IsOpenExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
IsWorkbook
1
2
3
4

```
Sub CheckWorkbook()


wbOpen = False
wbFilename = "Budget.xlsx"
```

⑤ Create a `For Each In` loop.

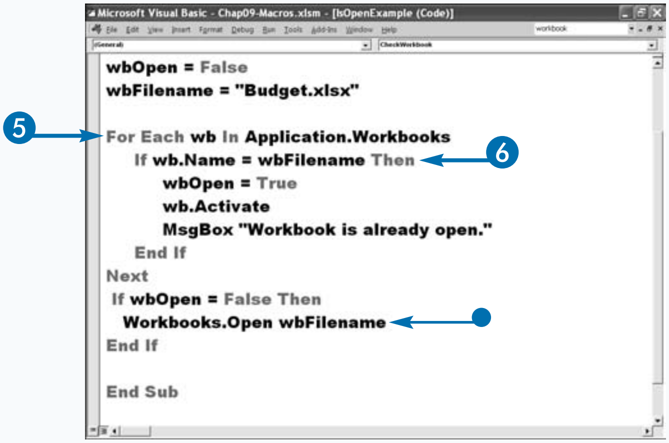
This statement allows you to review every open workbook.

⑥ Create an `If Then` statement.

The code looks at every open workbook; if it finds the workbook you requested, it activates the workbook and displays a message.

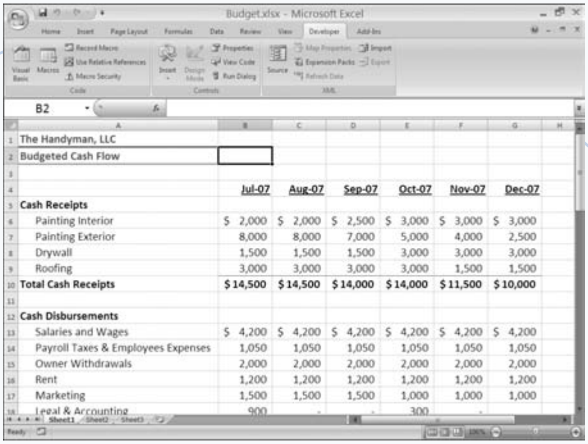
- If the macro does not find the workbook, it looks in the current directory and opens the workbook.

⑦ Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap09-Macros.xlsm - [IsOpenExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
CheckWorkbook
5
6

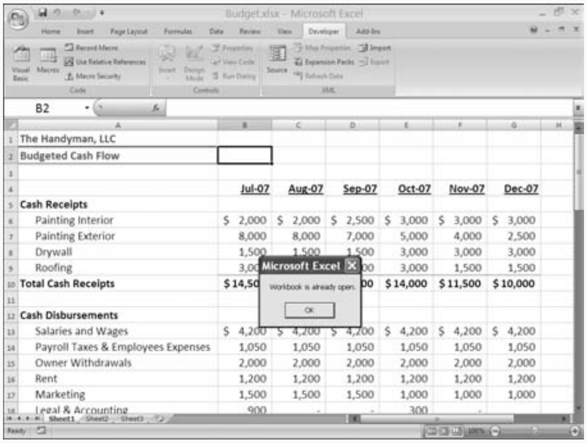
```
wbOpen = False
wbFilename = "Budget.xlsx"

For Each wb In Application.Workbooks
    If wb.Name = wbFilename Then
        wbOpen = True
        wb.Activate
        MsgBox "Workbook is already open."
    End If
Next
 If wbOpen = False Then
   Workbooks.Open wbFilename
End If

End Sub
```

The macro opens the file you specified and activates it.


Budget.xlsx - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Visual Basic
Macros
Record Macro
Use Relative References
Macro Security
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
B2
Sheet1
Sheet2
Sheet3
Ready
100%

	A	B	C	D	E	F	G	H
1	The Handyman, LLC							
2	Budgeted Cash Flow							
3								
4		Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	
5	Cash Receipts							
6	Painting Interior	$ 2,000	$ 2,000	$ 2,500	$ 3,000	$ 3,000	$ 3,000	
7	Painting Exterior	8,000	8,000	7,000	5,000	4,000	2,500	
8	Drywall	1,500	1,500	1,500	3,000	3,000	3,000	
9	Roofing	3,000	3,000	3,000	3,000	1,500	1,500	
10	Total Cash Receipts	$ 14,500	$ 14,500	$ 14,000	$ 14,000	$ 11,500	$ 10,000	
11								
12	Cash Disbursements							
13	Salaries and Wages	$ 4,200	$ 4,200	$ 4,200	$ 4,200	$ 4,200	$ 4,200	
14	Payroll Taxes & Employees Expenses	1,050	1,050	1,050	1,050	1,050	1,050	
15	Owner Withdrawals	2,000	2,000	2,000	2,000	2,000	2,000	
16	Rent	1,200	1,200	1,200	1,200	1,200	1,200	
17	Marketing	1,500	1,500	1,500	1,000	1,000	1,000	
18	Legal & Accounting	900	-	-	300	-		

If the file is already open, the macro displays the message, "Workbook is already open."


Budget.xlsx - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Visual Basic
Macros
Record Macro
Use Relative References
Macro Security
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
B2
Microsoft Excel
OK
Sheet1
Sheet2
Sheet3
Ready
100%

Workbook is already open.

	A	B	C	D	E	F	G	H
1	The Handyman, LLC							
2	Budgeted Cash Flow							
3								
4		Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07	
5	Cash Receipts							
6	Painting Interior	$ 2,000	$ 2,000	$ 2,500	$ 3,000	$ 3,000	$ 3,000	
7	Painting Exterior	8,000	8,000	7,000	5,000	4,000	2,500	
8	Drywall	1,500	1,500	1,500	3,000	3,000	3,000	
9	Roofing	3,00		00	3,000	1,500	1,500	
10	Total Cash Receipts	$ 14,50		00	$ 14,000	$ 11,500	$ 10,000	
11								
12	Cash Disbursements							
13	Salaries and Wages	$ 4,200	$ 4,200	$ 4,200	$ 4,200	$ 4,200	$ 4,200	
14	Payroll Taxes & Employees Expenses	1,050	1,050	1,050	1,050	1,050	1,050	
15	Owner Withdrawals	2,000	2,000	2,000	2,000	2,000	2,000	
16	Rent	1,200	1,200	1,200	1,200	1,200	1,200	
17	Marketing	1,500	1,500	1,500	1,000	1,000	1,000	
18	Legal & Accounting	900	-	-	300	-		

Extra

If a workbook is open, you can activate it by using the `Activate` method of the Workbook object. The activated workbook becomes the currently selected workbook in Excel. The `Activate` method has no parameters. Specify the workbook to activate, followed by the method.

Example:

```
Workbooks("Budget.xlsx").Activate
```

Using `Application.Workbooks` returns all workbooks, including hidden workbooks, but it does not return any open add-ins. To return a specific add-in, reference the add-in by name.

Example

```
Workbooks("OpenAddin.xla").
```

The Open method opens the specified add-in file. If you do not specify the path, Excel looks for the workbook in the current folder. See Chapter 16 for more information on add-ins.

Close a Workbook

You can close a workbook by using the `Close` method and referencing the `Workbook` object that contains the workbook you want to close. When you open a workbook, VBA assigns the workbook an index value. For example, VBA assigns the first workbook you open an index value of 1, and the next workbook you open an index value of 2. The Workbooks collection contains all open workbooks as individual Workbook objects. You can reference a workbook by using an index value, the name of the workbook, the `ActiveWorkbook` property, or the `ThisWorkbook` property. If you close a workbook that is running the macro and you have code after the `Close` statement, Excel may ignore the code. The following examples close a workbook:

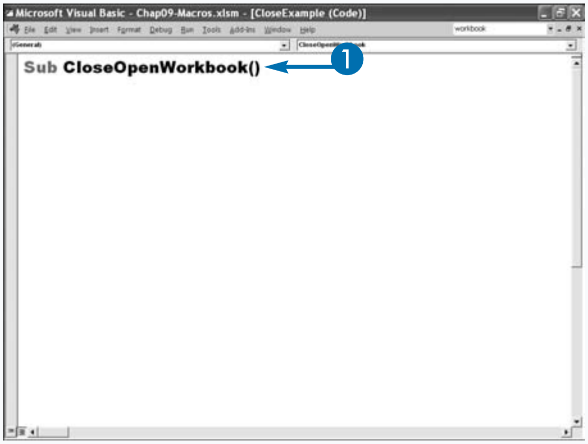
```
Workbooks(1).Close
Workbooks("Budget.xlsx").Close
ActiveWorkbook.Close
ThisWorkbook.Close
```

The `Close` method has three optional parameters: `SaveChanges`, `Filename`, and `RouteWorkbook`. Set the `SaveChanges` parameter to `True` to save changes to a workbook as it closes. A `SaveChanges` value of `False` closes the workbook without saving, and you lose any changes you have made since your last save. Use the `FileName` parameter to tell VBA the name you want to give your file when you save it.

If you set up the workbook to route, you can use the `RouteWorkbook` parameter to route the workbook to the next recipient on the routing list. You specify a value of `True` to route the workbook; you specify a value of `False` if you do not want the workbook to be sent to the next recipient.

Close a Workbook

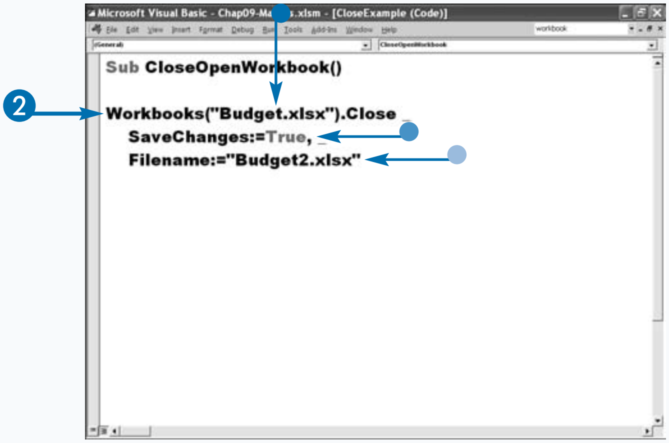
① Name your procedure.


Microsoft Visual Basic - Chap09-Macros.xlsm - [CloseExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
CloseOpenWorkbook
1

```
Sub CloseOpenWorkbook()
```

② Create your `Close` command.

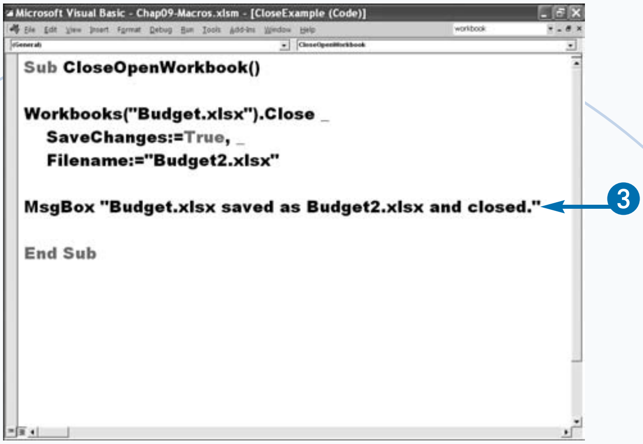
- The workbook that you want to close.
- Saves any changes.
- The new filename.


Microsoft Visual Basic - Chap09-Macros.xlsm - [CloseExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
CloseOpenWorkbook
2

```
Sub CloseOpenWorkbook()

Workbooks("Budget.xlsx").Close _
   SaveChanges:=True, _
   Filename:="Budget2.xlsx"
```

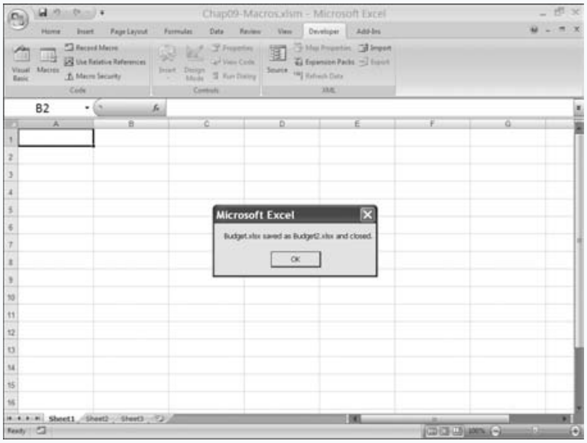
③ Create a message for the user.

④ Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap09-Macros.xlsm - [CloseExample (Code)]
(General)
CloseOpenWorkbook
3

```
Sub CloseOpenWorkbook()

Workbooks("Budget.xlsx").Close _
   SaveChanges:=True, _
   Filename:="Budget2.xlsx"

MsgBox "Budget.xlsx saved as Budget2.xlsx and closed."

End Sub
```

The macro closes the file specified in the macro, saves it under the name specified in the macro, and then displays a message to the user.


Chap09-Macros.xlsm - Microsoft Excel
B2
Microsoft Excel
OK
Sheet1
Sheet2
Sheet3

Budget.xlsx saved as Budget2.xlsx and closed.

Extra

By using the Close method with the Workbooks object, you can close all workbooks that you have open in Excel. If the SaveChanges parameter does not have a value specified, Excel checks to ensure that you have saved each workbook since its last modification. If a workbook contains modifications, Excel prompts you to save the workbook. The following example closes all open workbooks.

Example:

```
Workbooks.Close
```

When you close all workbooks, Excel remains open. If you want Excel to close, use the Quit method with the Application object.

Example:

```
Application.Quit
```

Before closing Excel, the Quit method first closes the open workbooks. If any of the workbooks contain changes, Excel prompts you to save the changes. If you do not want to save modified worksheets and you do not want the dialog box to ask you to save changes, set the `DisplayAlerts` property to `False`. This property determines whether the alert message displays when Excel performs a task.

Example:

```
Application.DisplayAlerts = False
```

Create a New Workbook

To create a new Excel workbook, use the `Add` method with the `Workbooks` collection. The `Add` method has one optional parameter: `Template`. The following is the syntax for the `Add` method:

`Workbooks.Add(Template).`

To tell VBA how to create a workbook, use the Template parameter. You can use another workbook or one of the four `XlWBATemplate` constant values as the template parameter.

When you use a workbook as the template, Excel copies the workbook into a new workbook. You can use the name of the workbook as the parameter if the workbook is located in the current folder. If the workbook is located in another folder, use the path to the workbook.

The `XlWBATemplate` constant has four values. You can use `xlWBATWorksheet` to create a workbook containing one worksheet; `xlWBATChart` to create a workbook containing one chart sheet; `xlWBATExcel4MacroSheet` to create an Excel 4.0 macro sheet; and `xlWBATExcel4IntMacroSheet` to create an international macro sheet.

When you use the `Add` method without the template parameter, Excel creates a new workbook with the name Book1.xlsx. If a workbook already exists with that name, Excel assigns the name Book2.xlsx. You can use the `Title` property to specify the title of the workbook. To name and save the new workbook, you can use the `SaveAs` method. See the section, “Save a Workbook,” for more information on the `SaveAs` method.

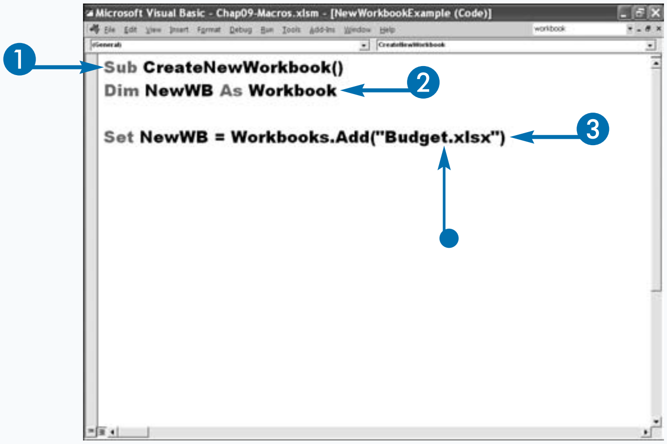
Create a New Workbook

① Name your procedure.

② Declare a new Workbook object.

③ Create your `Add` command.

- The workbook that you want to use as a template.

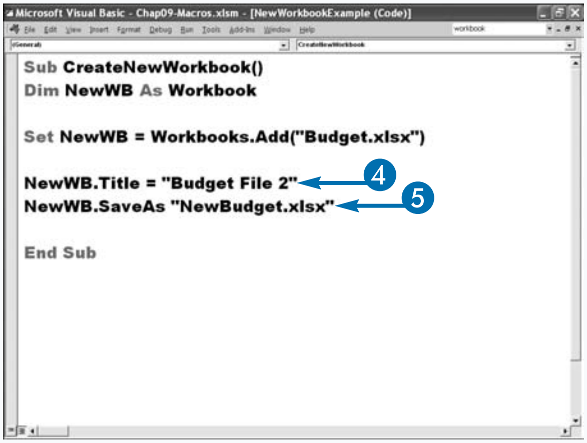

Microsoft Visual Basic - Chap09-Macros.xlsm - [NewWorkbookExample (Code)]
(General)
CreateNewWorkbook
1
2
3

```
Sub CreateNewWorkbook()
Dim NewWB As Workbook

Set NewWB = Workbooks.Add("Budget.xlsx")
```

④ Assign a title to your workbook.

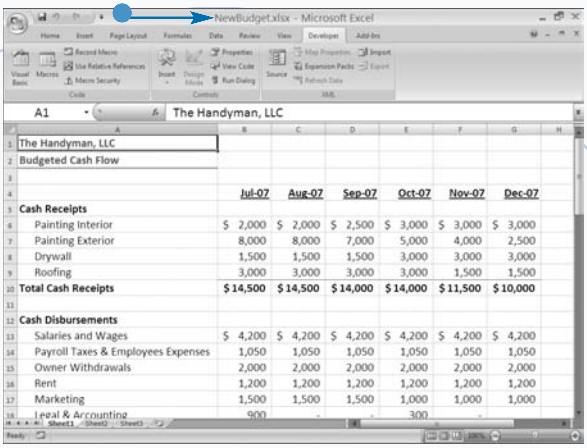
⑤ Name and save your workbook.

⑥ Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap09-Macros.xlsm - [NewWorkbookExample (Code)]
(General)
CreateNewWorkbook
4
5

```
Sub CreateNewWorkbook()
Dim NewWB As Workbook

Set NewWB = Workbooks.Add("Budget.xlsx")

NewWB.Title = "Budget File 2"
NewWB.SaveAs "NewBudget.xlsx"

End Sub
```

- The macro creates and saves the new workbook.

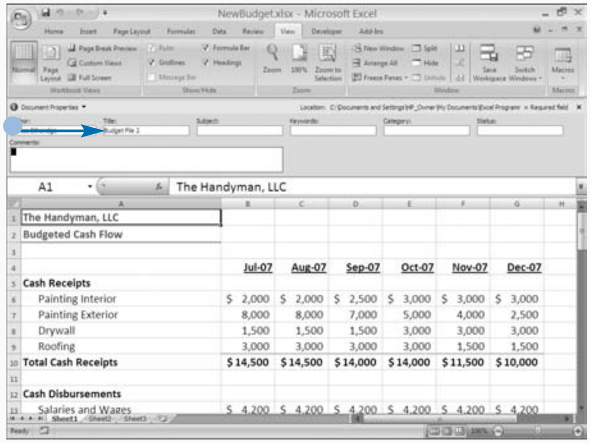


NewBudget.xlsx - Microsoft Excel

A1 The Handyman, LLC

	A	B	C	D	E	F	G
1	The Handyman, LLC						
2	Budgeted Cash Flow						
3							
4		Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07
5	**Cash Receipts**						
6	Painting Interior	$ 2,000	$ 2,000	$ 2,500	$ 3,000	$ 3,000	$ 3,000
7	Painting Exterior	8,000	8,000	7,000	5,000	4,000	2,500
8	Drywall	1,500	1,500	1,500	3,000	3,000	3,000
9	Roofing	3,000	3,000	3,000	3,000	1,500	1,500
10	**Total Cash Receipts**	**$ 14,500**	**$ 14,500**	**$ 14,000**	**$ 14,000**	**$ 11,500**	**$ 10,000**
11							
12	**Cash Disbursements**						
13	Salaries and Wages	$ 4,200	$ 4,200	$ 4,200	$ 4,200	$ 4,200	$ 4,200
14	Payroll Taxes & Employees Expenses	1,050	1,050	1,050	1,050	1,050	1,050
15	Owner Withdrawals	2,000	2,000	2,000	2,000	2,000	2,000
16	Rent	1,200	1,200	1,200	1,200	1,200	1,200
17	Marketing	1,500	1,500	1,500	1,000	1,000	1,000
18	Legal & Accounting	900	-	-	300	-	

- The macro adds the title to the Document Properties pane.



NewBudget.xlsx - Microsoft Excel

Document Properties

Title: Budget File 1

A1 The Handyman, LLC

	A	B	C	D	E	F	G
1	The Handyman, LLC						
2	Budgeted Cash Flow						
3							
4		Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07
5	**Cash Receipts**						
6	Painting Interior	$ 2,000	$ 2,000	$ 2,500	$ 3,000	$ 3,000	$ 3,000
7	Painting Exterior	8,000	8,000	7,000	5,000	4,000	2,500
8	Drywall	1,500	1,500	1,500	3,000	3,000	3,000
9	Roofing	3,000	3,000	3,000	3,000	1,500	1,500
10	**Total Cash Receipts**	**$ 14,500**	**$ 14,500**	**$ 14,000**	**$ 14,000**	**$ 11,500**	**$ 10,000**
11							
12	**Cash Disbursements**						
13	Salaries and Wages	$ 4,200	$ 4,200	$ 4,200	$ 4,200	$ 4,200	$ 4,200

Extra

You can use the following properties with the Workbook object.

PROPERTY	DESCRIPTION
ActiveSheet	The string indicating the name of the active sheet in the workbook.
FileFormat	The Read-Only value indicating the format of the workbook. This value returns an `XlFileFormat` constant; see Appendix A for more information.
FullName	The Read-Only string indicating the name and complete path to the workbook.
HasPassword	The Read-Only Boolean value indicating whether the workbook is password-protected.
Name	A string indicating the name of the workbook.
Password	Returns or sets the password string for the workbook.
Path	Returns the complete Excel application path.
ProtectStructure	The Read-Only Boolean value indicating whether the order of the sheets in the workbook is protected. If True, you cannot move, delete, or add worksheets.
ReadOnly	The Read-Only Boolean value indicating whether the workbook was opened as Read-Only.
ReadOnlyRecommended	The Read-Only Boolean value indicating whether the workbook was saved as Read-Only.
Saved	Contains a Boolean value indicating whether changes were made since the workbook was saved.

Delete a File

The VBA `Kill` statement deletes a workbook or file. You can use this statement to delete any file that the user has permission to delete. The following is the syntax for the `Kill` statement:

```
Kill(Pathname)
```

The `Kill` statement requires one argument: `Pathname`. The `Pathname` argument is a string referencing the files you want to delete. You can use the name of a workbook as the parameter if the workbook is located in the current folder. If the workbook is located in another folder, use the path to the workbook. Make sure you enclose the path in quotes.

You can specify the name of a single file by typing the complete filename, including the extension. You can remove multiple files at once by using wildcard symbols to specify multiple characters. An asterisk (*) represents multiple characters, and a question mark (?) represents a single character. For example, you can remove the entire contents of a folder by using the *.* specification. The statement `Kill "C:\Excel Files\*.*"` deletes every file in the Excel Files folder. If you only want to remove the Excel workbooks, you can use `Kill "C:\Excel Files\*.xls?"`.

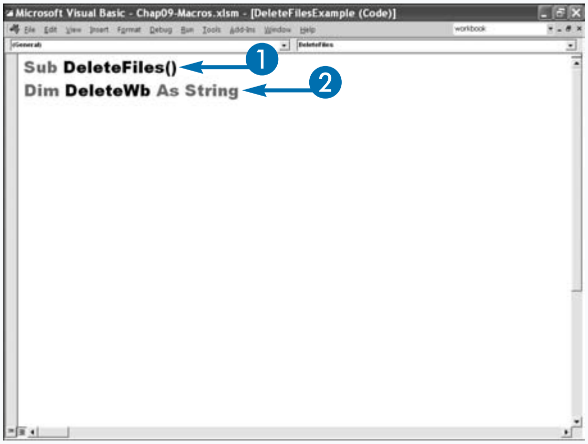
You cannot delete open files. If you attempt to do so, a Permission Denied error appears. You also cannot delete files that are Read-Only. If you attempt to delete a Read-Only file, Excel displays a Path/File access error message.

Delete a File

① Name your procedure.

② Declare your variables.

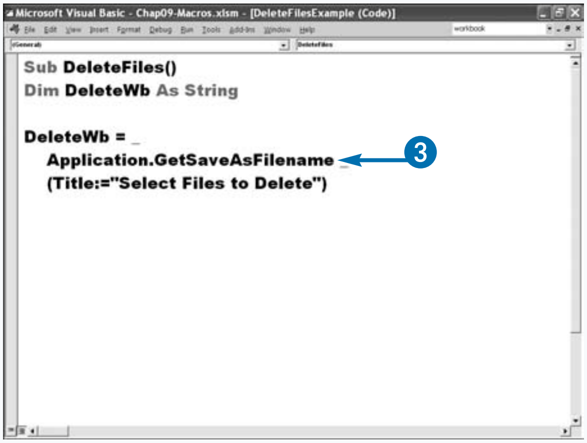
This example uses the `DeleteWb` variable to store the name of the file you want the user to delete.


Microsoft Visual Basic - Chap09-Macros.xlsm - [DeleteFilesExample (Code)]
(General)
DeleteFiles
1
2

```
Sub DeleteFiles()
Dim DeleteWb As String
```

③ Use the `GetSaveAsFilename` method to request from the user the file that the user wants to delete.

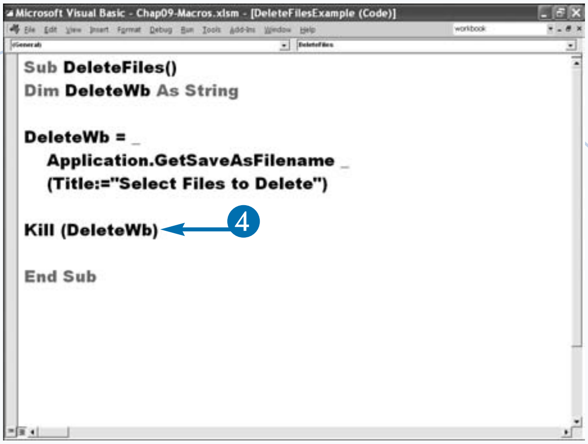
Note: *See the section, "Save a Workbook in a Format Specified by the User," to learn more about the* `GetSaveAsFilename` *method.*


Microsoft Visual Basic - Chap09-Macros.xlsm - [DeleteFilesExample (Code)]
(General)
DeleteFiles
3

```
Sub DeleteFiles()
Dim DeleteWb As String

DeleteWb = _
    Application.GetSaveAsFilename _
    (Title:="Select Files to Delete")
```

④ Delete the file.

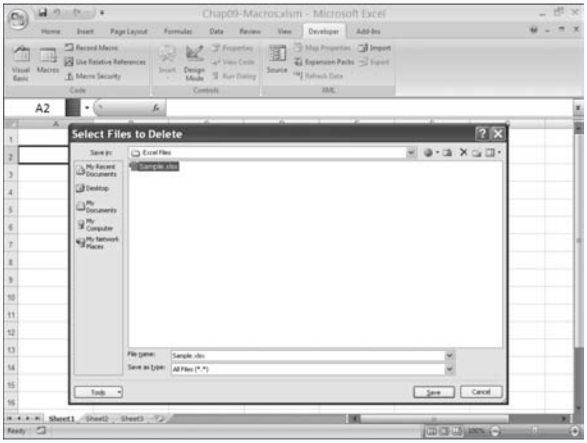
⑤ Press Alt+F11 to switch from the VBE to Excel, and run the macro.



```
Sub DeleteFiles()
Dim DeleteWb As String

DeleteWb = _
    Application.GetSaveAsFilename _
    (Title:="Select Files to Delete")

Kill (DeleteWb)

End Sub
```

Microsoft Visual Basic - Chap09-Macros.xlsm - [DeleteFilesExample (Code)]
(General)
DeleteFiles
④

The macro requests a filename and then deletes the file.



Chap09-Macros.xlsm - Microsoft Excel
Select Files to Delete
Save in:
Excel Files
Sample.xlsx
File name:
Sample.xlsx
Save as type:
All Files (*.*)
Tools
Save
Cancel

Extra

The `Kill` statement only removes files; it does not remove folders. To delete a folder, use the `RmDir` statement. The `RmDir` statement takes one argument: `Path`. If you omit the argument, VBA tries to delete the current folder. For the path argument, specify the location of the folder that you want to remove. For example, the code `RmDir("Excel Files")` removes the Excel Files folder. The `RmDir` statement only removes folders; it does not remove any files. If the folder you are deleting contains any files, an error appears telling you that Excel cannot remove the folder.

When working with folders, you may need to know the current path. To determine the path to the current folder, use the `CurDir` function. The `CurDir` function returns a string containing the path to the current folder. You can assign the value returned by the function to a variable, as shown in following example.

Example:

```
CurrentFolder= CurDir
```

Add a Sheet

To add a new sheet to a workbook, you can use the `Add` method with the `Sheets` object. You can use this method to add a worksheet, chart sheet, or macro sheet. The `Add` method has four optional parameters that specify where in the workbook to place the sheet, the number of sheets to add, and the type of sheet to create. The following is the syntax for the `Add` method when used with the `Sheets` object:

```
expression.Add(Before, After, Count, Type)
```

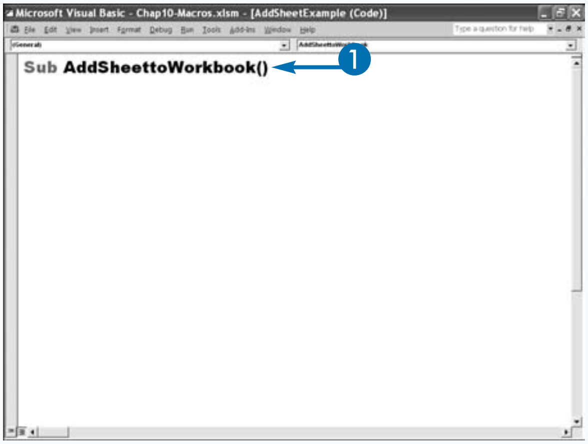
Use the `expression` to identify the workbook to which you want to add a worksheet. Use the `Before` parameter to tell VBA the worksheet before which you want to place the new worksheet, or use the `After` parameter to tell VBA the worksheet after which you want to place the new worksheet. Excel references sheets in a `Worksheets` collection based on the order of the sheets in the workbook from left to right. The first worksheet on the left has an index value of 1 and is referred to as `Worksheet(1)`. To reference a sheet, you can use the sheet name or the `Worksheets` collection with an index value, as in this example: `ThisWorkbook.Sheets.Add Before:=Worksheets(1)`.

You can use the `Count` parameter to add multiple sheets to a workbook. If you do not specify a value for the `Count` parameter, Excel adds one sheet.

By default, the `Add` method creates a worksheet. You can also use this method to create chart or macro sheets. You specify the type of sheet you want to create by using one of the four `XlSheetType` constant values: You use `xlWorksheet` to add a new worksheet, `xlChart` to add a chart sheet, `xlExcel4MacroSheet` to add a macro sheet, and `xlExcel4IntMacroSheet` to add an international macro sheet.

Add a Sheet

① Name your procedure.

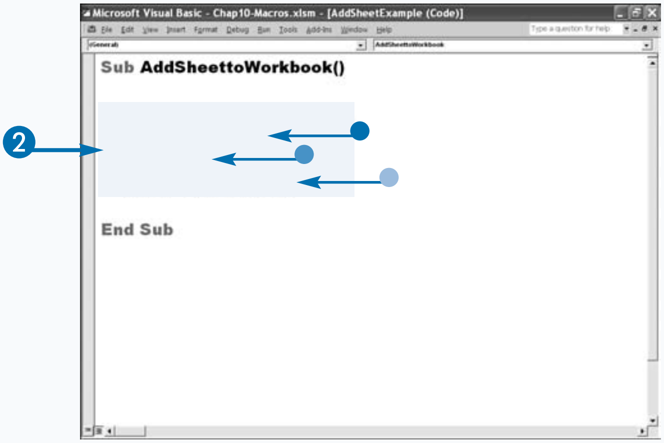

Microsoft Visual Basic - Chap10-Macros.xlsm - [AddSheetExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
AddSheettoWorkbook
1

```
Sub AddSheettoWorkbook()
```

② Create your `Add` command.

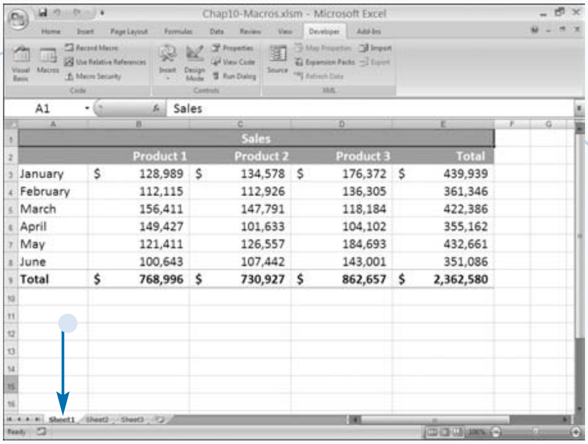
- The sheet before which you want to add the new sheets.
- The number of sheets you want to add.
- The type of sheet you want to add.

③ Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap10-Macros.xlsm - [AddSheetExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
AddSheettoWorkbook
2

```
Sub AddSheettoWorkbook()

End Sub
```

- The workbook before you run the macro.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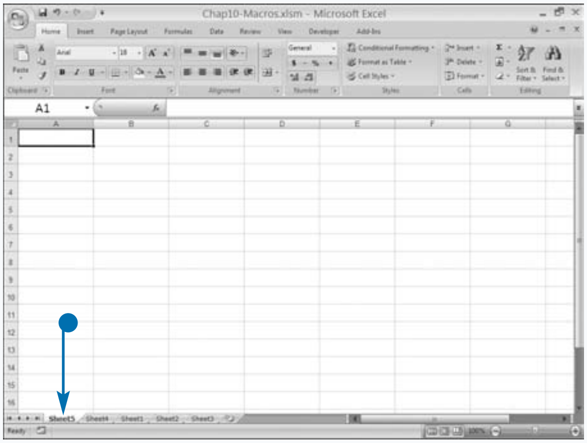
A1 Sales

	Sales			
	Product 1	Product 2	Product 3	Total
January	$ 128,989	$ 134,578	$ 176,372	$ 439,939
February	112,115	112,926	136,305	361,346
March	156,411	147,791	118,184	422,386
April	149,427	101,633	104,102	355,162
May	121,411	126,557	184,693	432,661
June	100,643	107,442	143,001	351,086
Total	**$ 768,996**	**$ 730,927**	**$ 862,657**	**$ 2,362,580**

- The workbook after you run the macro.

  The macro adds two worksheets before the first worksheet in the workbook.


Chap10-Macros.xlsm - Microsoft Excel
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A1
Sheet5
Sheet4
Sheet1
Sheet2
Sheet3
Ready

Extra

If you know that you want Excel to add new sheets before the first sheet in the workbook or after the last sheet, reference an element of the `Worksheets` collection. Excel always makes the first sheet in the workbook the first element in the `Worksheets` collection. You can refer to it as `Worksheets(1)`. You can use the `Count` method with the `Worksheets` object to determine the last sheet in the workbook. The expression `Worksheets.Count` returns the total number of worksheets in the `Worksheets` collection. The following example places a worksheet after the last sheet in the workbook.

Example:

```
ThisWorkbook.Sheets.Add _
      After:=Worksheets(Worksheets.Count)
```

You can also reference a sheet by name. For example, by default, Excel names worksheets Sheet1, Sheet2, and so on. If you want to place new sheets before Sheet1, use the following as the `Before` parameter: `Before:=Worksheets("Sheet1")`.

Delete a Sheet

You can delete or remove from a workbook any sheet you can modify. If you open the workbook in Read-Only mode or if someone has protected the worksheet, you may not be able to remove the sheet.

To delete worksheets, use the `Delete` method with the `Sheets` object. You can remove any sheet from the workbook, including sheets, chart sheets, and macro sheets. To use the `Delete` method, you simply identify the sheet you want to remove. The following example removes the first sheet in a workbook:

```
Sheets(1).Delete
```

Every sheet has an index value. This example deletes the sheet with the index value of 1. Excel numbers sheets and charts as you add them to the workbook as follows: Sheet1, Sheet2, and so on (or Chart1, Chart2, and so on). However, the VBA index number does not always correspond with the number given to the sheet by Excel. VBA assigns index values numerically, starting with the first sheet on the left. If you move sheets within your workbook, Excel reorders them in the `Sheets` object. The first sheet on the left always has an index value of 1.

You can also use the sheet name to reference the sheet you want to delete. You must enclose the name of the sheet in quotes, as in the following example:

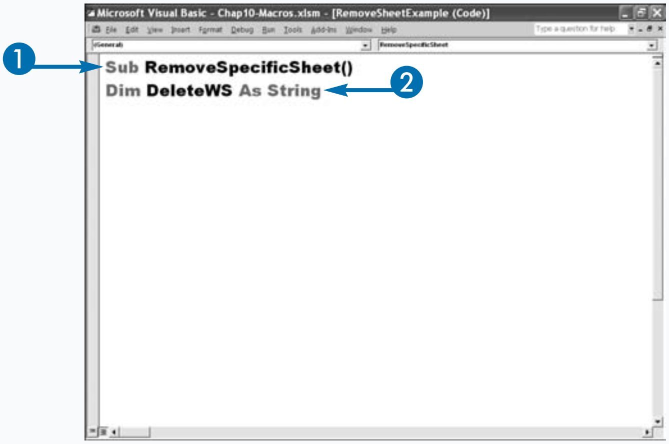
```
Sheets("Sheet3").Delete
```

Whenever you perform a deletion, Excel displays a message box to verify that you really want to remove the sheet. Click Yes to remove the specified sheet from the workbook. Remember that if the sheet contains any data, Excel permanently removes the data.

Delete a Sheet

① Name your procedure.

② Declare your variables.


Microsoft Visual Basic - Chap10-Macros.xlsm - [RemoveSheetExample (Code)]
(General)
RemoveSpecificSheet
1
2

```
Sub RemoveSpecificSheet()
Dim DeleteWS As String
```

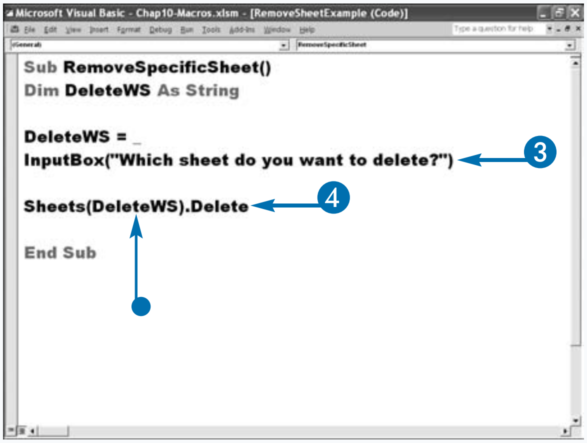
③ Create an input box.

The users enter the name of the sheet they want to delete into the input box, and VBA stores the name to a variable.

④ Create a Delete command.

- The variable containing the worksheet that the user wants to delete.

⑤ Press Alt+F11 to switch from the VBE to Excel and then run the macro.


Microsoft Visual Basic - Chap10-Macros.xlsm - [RemoveSheetExample (Code)]
(General)
RemoveSpecificSheet
3
4

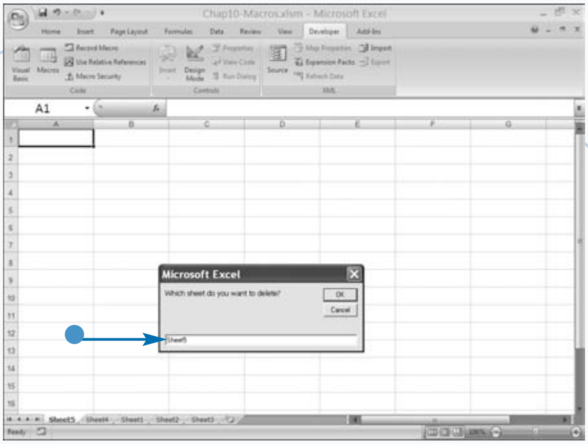
```
Sub RemoveSpecificSheet()
Dim DeleteWS As String

DeleteWS = _
InputBox("Which sheet do you want to delete?")

Sheets(DeleteWS).Delete

End Sub
```

- The macro displays the message box requesting the sheet the user wants to delete.



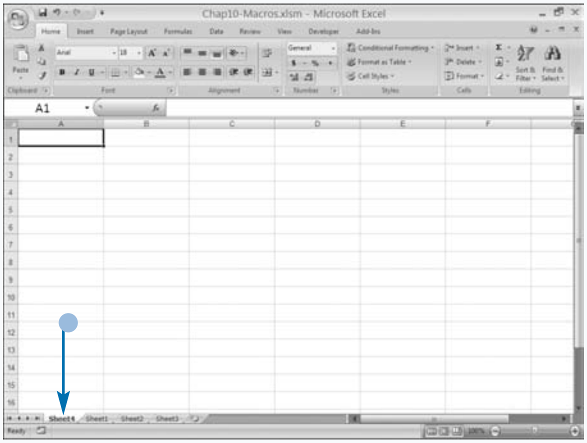
Microsoft Excel

Which sheet do you want to delete?

Sheet5

Chap10-Macros.xlsm - Microsoft Excel
OK
Cancel
Sheet5
Sheet4
Sheet1
Sheet2
Sheet3
Ready

- The macro deletes the sheet.



Chap10-Macros.xlsm - Microsoft Excel
A1
Sheet4
Sheet1
Sheet2
Sheet3
Ready

Extra

If you want to create a procedure that removes only worksheets from the workbook, you can use the `Delete` method with a `Worksheets` object instead of the `Sheets` object. The `Sheets` object contains all worksheets, chart sheets, and macro sheets that are open in a workbook, whereas the `Worksheets` object only keeps track of the open worksheets. If you use the `Worksheets` object to remove the first worksheet in the workbook, Excel ignores any chart sheets before the first worksheet. The following statement deletes the first worksheet in the workbook and ignores any other sheet types.

Example:

```
Worksheets(1).Delete
```

If you want to create a procedure that removes only chart sheets from a workbook, you can use the `Delete` method with the `Charts` object. The `Charts` object contains all of the chart sheets that are contained in the workbook. This method works only with chart sheets, not charts embedded in worksheets. When you use the `Charts` object with the `Delete` method, Excel only considers actual chart sheets and ignores any worksheets, even if they exist before the specified chart sheet. The following statement deletes the first chart sheet in the workbook and ignores any other sheet types.

Example:

```
Charts(1).Delete
```

Move a Sheet

You can use the `Move` method with the `Sheets` object to rearrange sheets within a workbook. When you move a sheet, you indicate the new location by specifying the name of the sheet before or after which you want to place the sheet you are moving.

The `Move` method has two optional parameters: `Before` and `After`. Although both parameters are optional, you can use only one of them at a time. Use the `Before` parameter to specify the sheet in front of which you want to place a sheet, and the `After` parameter to specify the sheet after which you want to place a sheet. For example, the following statement moves the first sheet in a workbook and places it after the third sheet:

```
Sheets(1).Move After:=Sheets(3)
```

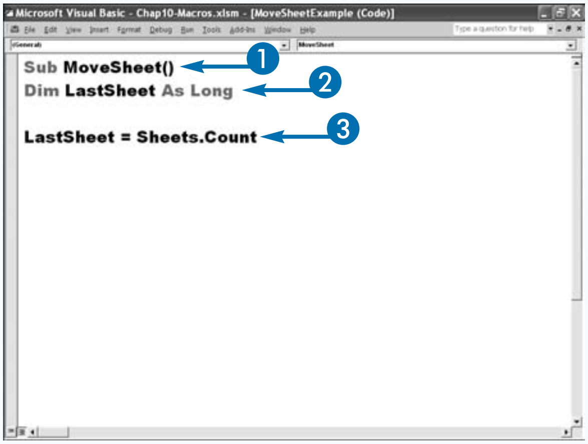
If you do not specify a `Before` or `After` parameter value, Excel creates a new workbook and places the worksheet in that workbook. The worksheet becomes the only worksheet in the new workbook.

The `Sheets` object references all sheets in the workbook, including all worksheets, chart sheets, and macro sheets. As shown in the example, you can use index values to reference specific sheets based on their order in the workbook. You can also reference a sheet by using the name on the sheet tab.

Moving a sheet before or after a nonexistent sheet causes VBA to display a “Subscript out of range” error. To avoid this error, you can use the `Count` method to determine the number of sheets in the workbook before you attempt to move the sheets.

Move a Sheet

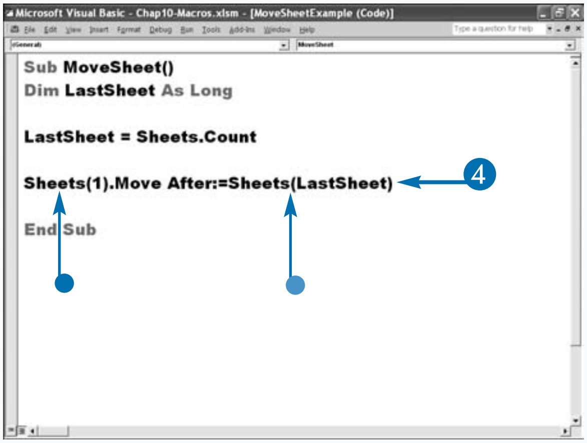
1. Name your procedure.
2. Declare your variables.
3. Count the number of sheets in your workbook.


Microsoft Visual Basic - Chap10-Macros.xlsm - [MoveSheetExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
MoveSheet
1
2
3

```
Sub MoveSheet()
Dim LastSheet As Long

LastSheet = Sheets.Count
```

4. Create your `Move` command.
   - The sheet you want to move.
   - The location where you want to move your sheet.
5. Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap10-Macros.xlsm - [MoveSheetExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
MoveSheet
4

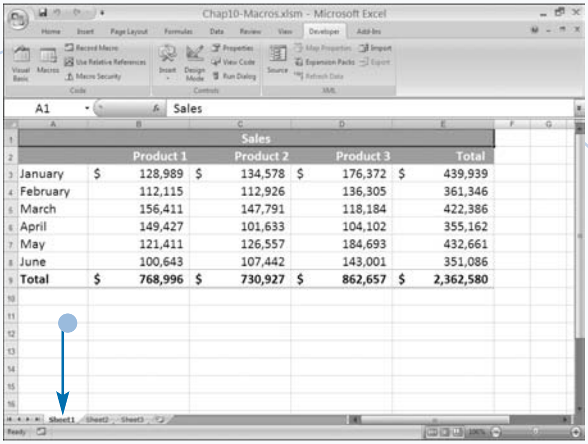
```
Sub MoveSheet()
Dim LastSheet As Long

LastSheet = Sheets.Count

Sheets(1).Move After:=Sheets(LastSheet)

End Sub
```

- The worksheet before the move.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View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
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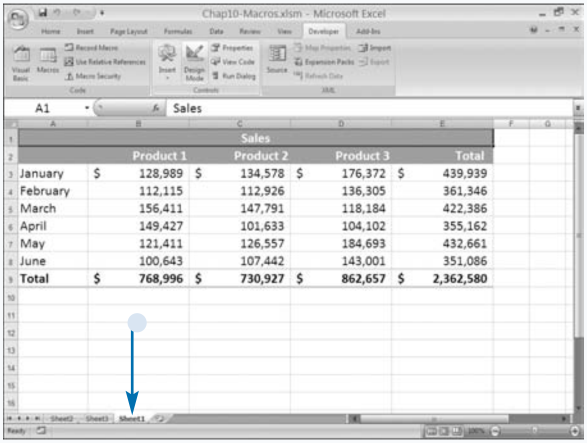
A1
Sheet1
Sheet2
Sheet3
Ready

A1 Sales

Sales				
	Product 1	Product 2	Product 3	Total
January	$ 128,989	$ 134,578	$ 176,372	$ 439,939
February	112,115	112,926	136,305	361,346
March	156,411	147,791	118,184	422,386
April	149,427	101,633	104,102	355,162
May	121,411	126,557	184,693	432,661
June	100,643	107,442	143,001	351,086
Total	**$ 768,996**	**$ 730,927**	**$ 862,657**	**$ 2,362,580**

- The worksheet after the move.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Design Mode
Properties
View Code
Run Dialog
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Source
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Expansion Packs
Refresh Data
Import
Export
XML
A1
Sheet2
Sheet3
Sheet1
Ready

A1 Sales

Sales				
	Product 1	Product 2	Product 3	Total
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June	100,643	107,442	143,001	351,086
Total	**$ 768,996**	**$ 730,927**	**$ 862,657**	**$ 2,362,580**

Apply It

As you work with Excel objects in VBA, especially collection objects that contain several objects, you frequently must determine the number of objects in the collection. Because the number of objects in a collection varies, you may need to determine the number of objects as your code runs. The best way to do this is by using the `Count` property, which works with virtually all VBA collection objects and returns the number of items in the collection.

Example:

```
NumSheets = Worksheets.Count
```

The `Count` property is Read-Only, meaning you can use it to count, but not change, the number of sheets in a workbook.

Copy and Paste a Sheet

If you want to copy and paste sheets in a workbook, you can use the `Copy` method with the `Sheets` object. When you copy a sheet, you indicate where you want to place the copy by specifying the name of the sheet before or after which you want the copy to appear.

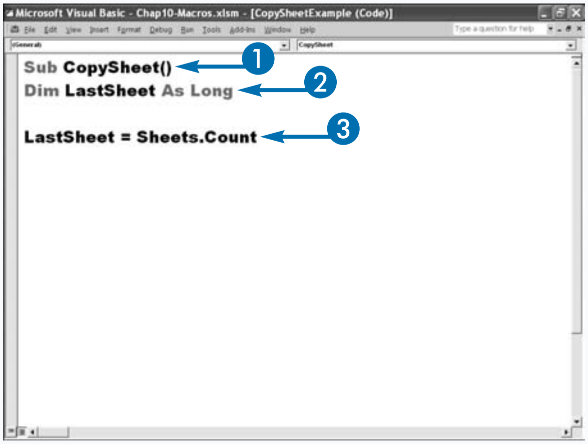
The `Copy` method has two optional parameters: `Before` and `After`. Although both parameters are optional, you can only use one of them at a time. Use the `Before` parameter to specify the sheet in front of which you want to place the copy of the sheet, or use the `After` parameter to specify the sheet after which you want to place the copy of the sheet. The following statement copies the first sheet in a workbook and places the copy after the third sheet: `Sheets(1).Copy After:=Sheets(3)`. If you do not specify a `Before` or `After` value, Excel creates a new workbook and places the copy in the new workbook.

When you use the `Sheets` object, you can reference all sheets within a workbook, including chart sheets and macro sheets. You can use index values to reference sheets based on their order in the workbook, or you can reference sheets by using their sheet names.

Be careful with the sheet references you use. If you try to place a copy of a sheet before or after a nonexistent sheet, VBA displays a "Subscript out of range" error. To avoid this error, consider using the `Count` method to determine exactly how many sheets you have in a workbook before you copy and paste.

Copy and Paste a Sheet

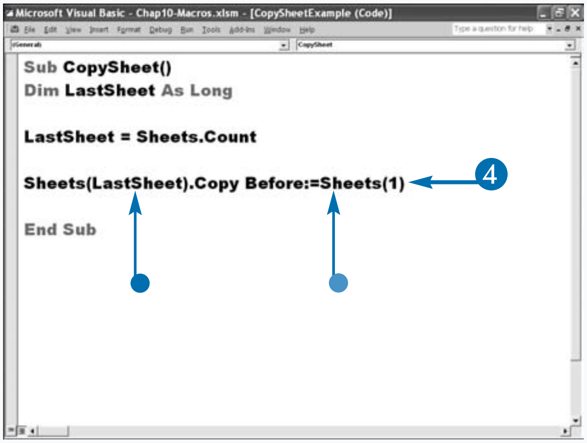
1. Name your procedure.
2. Declare your variables.
3. Count the number of sheets in your workbook.


Microsoft Visual Basic - Chap10-Macros.xlsm - [CopySheetExample (Code)]
(General)
CopySheet
1
2
3

```
Sub CopySheet()
Dim LastSheet As Long

LastSheet = Sheets.Count
```

4. Create your `Copy` command.
   - The sheet you want to copy.
   - Where you want to place the copy.
5. Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap10-Macros.xlsm - [CopySheetExample (Code)]
(General)
CopySheet
4

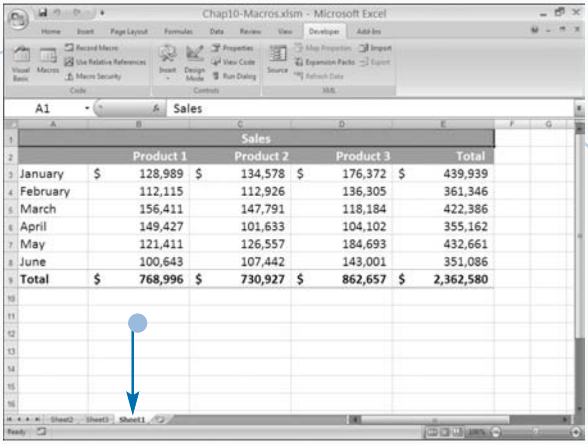
```
Sub CopySheet()
Dim LastSheet As Long

LastSheet = Sheets.Count

Sheets(LastSheet).Copy Before:=Sheets(1)

End Sub
```

- The workbook before you run the macro.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Refresh Data
Import
Export
XML
A1
Sales
Sheet2
Sheet3
Sheet1
Ready

Sales				
	Product 1	Product 2	Product 3	Total
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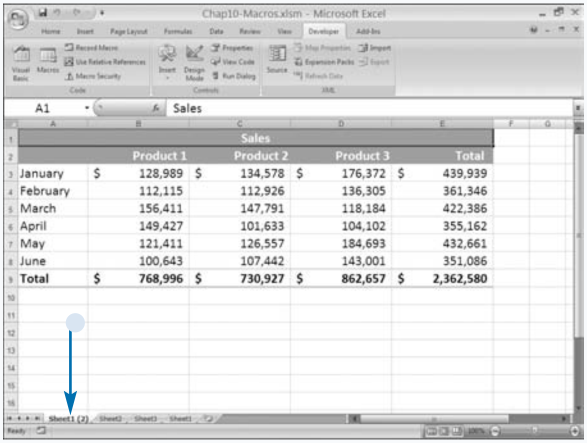
June	100,643	107,442	143,001	351,086
Total	**$ 768,996**	**$ 730,927**	**$ 862,657**	**$ 2,362,580**

- The workbook after you run the macro.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Properties
View Code
Run Dialog
Controls
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Map Properties
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A1
Sales
Sheet1 (2)
Sheet2
Sheet3
Sheet1
Ready

Sales				
	Product 1	Product 2	Product 3	Total
January	$ 128,989	$ 134,578	$ 176,372	$ 439,939
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June	100,643	107,442	143,001	351,086
Total	**$ 768,996**	**$ 730,927**	**$ 862,657**	**$ 2,362,580**

Extra

The `Copy` method produces the same results when you use it with a `Chart` object, `Charts` collection object, `Worksheet` object, or `Worksheets` collection object instead of the `Sheets` object. You can use these other objects when you want to work with a specific type of sheet. For example, to make a worksheet the first worksheet in a workbook, type **Worksheet(3).Copy Before:=Worksheets(1)**. This code places a copy of the third worksheet in front of the first worksheet. If the first sheet in the workbook is a chart, the copied sheet comes after the chart but before the first worksheet. You can copy chart sheets the same way, but use the `Charts` collection object to specify the chart sheet to copy. You can combine your object references within a `Copy` statement. For example, you can place a copy of the first worksheet before the first chart sheet.

Example:

```
Worksheets(1).Copy Before:=Charts(1)
```

When you copy a sheet in a workbook, Excel indicates the sheet is a copy by placing a number in parentheses after the sheet name. For example, for Sheet3, Excel indicates the copied sheet as Sheet3 (2), with the number in parentheses indicating that the sheet is the second version. Copying the worksheet again creates Sheet3 (3).

Hide a Sheet

If you want to hide sheets in a workbook, you can use the `Visible` property with the `Sheets` object. You may want to hide sheets in a workbook to prevent users from viewing them. These sheets might contain the raw values that you use to calculate data.

Hiding a sheet does not always keep users from accessing it. Users can unhide sheets in Excel by using the Unhide option on the Format menu. If you want others to be able to unhide a sheet but not be able to change a sheet, protect the sheet. See the section, “Protect a Worksheet,” for more information about protecting sheets.

Using the `Visible` property, you can determine the current state of a sheet — visible or not visible — or you can change the state of a sheet. To determine the current state of a sheet, you assign the `Visible` property to a Boolean variable as follows: `SheetProps = Sheets(1).Visible`. If you declare the `SheetProps` variable as a Boolean value, the variable receives a value of `True` if the specified sheet is visible; otherwise, it receives a value of `False`. If you do not declare the variable as Boolean, Excel assigns a numeric value of –1 if the sheet is visible and 0 if the sheet is not visible.

To change the visibility of a sheet, you can assign a Boolean value of `True` or `False` to the sheet’s `Visible` property. You can hide all but one sheet in a workbook, because Excel requires that a workbook have at least one visible sheet. The following example hides a sheet:

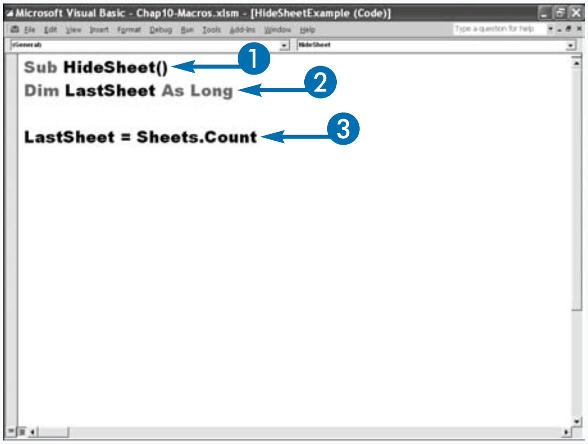
```
Sheets(2).Visible = False
```

Hide a Sheet

① Name your procedure.

② Declare your variables.

③ Count the number of sheets in your workbook.


Microsoft Visual Basic - Chap10-Macros.xlsm - [HideSheetExample (Code)]
(General)
HideSheet
1
2
3

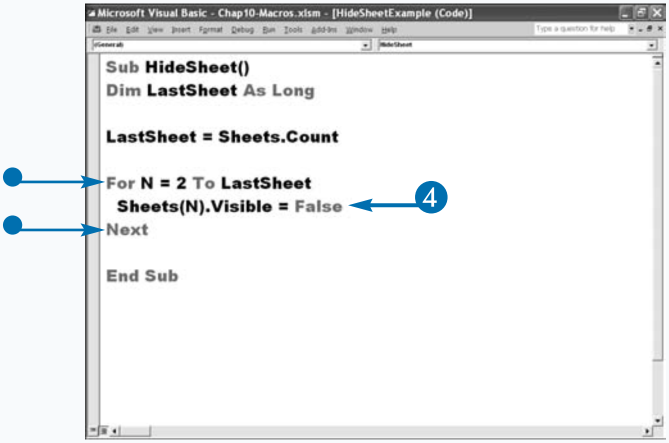
```
Sub HideSheet()
Dim LastSheet As Long

LastSheet = Sheets.Count
```

④ Set the `Visible` property to `False`.

- This example uses a `For Next` loop to hide every worksheet except for the first one.

⑤ Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap10-Macros.xlsm - [HideSheetExample (Code)]
(General)
HideSheet
4

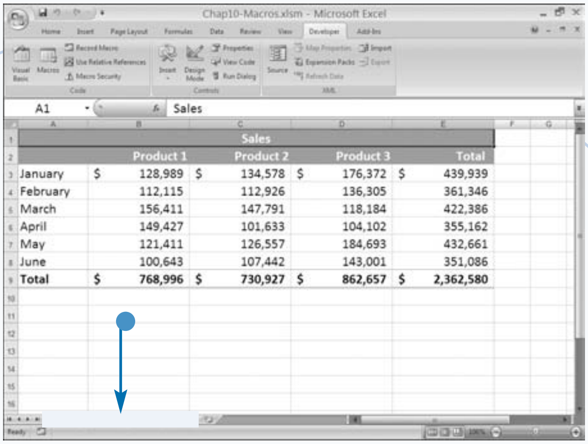
```
Sub HideSheet()
Dim LastSheet As Long

LastSheet = Sheets.Count

For N = 2 To LastSheet
 Sheets(N).Visible = False
Next

End Sub
```

- The workbook before you execute the macro.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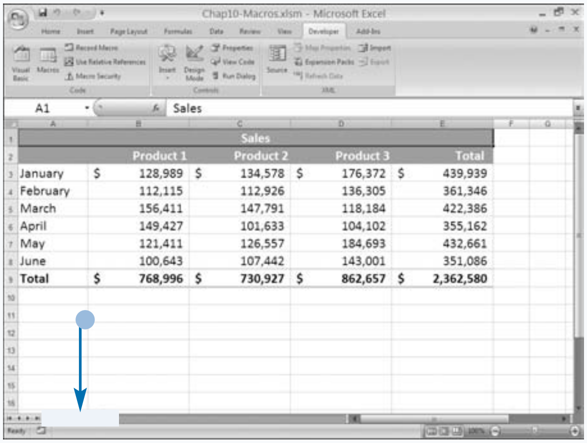
Use Relative References
Macro Security
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
A1
Sales
Ready

Sales				
	Product 1	Product 2	Product 3	Total
January	$ 128,989	$ 134,578	$ 176,372	$ 439,939
February	112,115	112,926	136,305	361,346
March	156,411	147,791	118,184	422,386
April	149,427	101,633	104,102	355,162
May	121,411	126,557	184,693	432,661
June	100,643	107,442	143,001	351,086
Total	**$ 768,996**	**$ 730,927**	**$ 862,657**	**$ 2,362,580**

- The workbook after you execute the macro.


Chap10-Macros.xlsm - Microsoft Excel
Home
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Visual Basic
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Use Relative References
Macro Security
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View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
A1
Sales
Ready

Sales				
	Product 1	Product 2	Product 3	Total
January	$ 128,989	$ 134,578	$ 176,372	$ 439,939
February	112,115	112,926	136,305	361,346
March	156,411	147,791	118,184	422,386
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May	121,411	126,557	184,693	432,661
June	100,643	107,442	143,001	351,086
Total	**$ 768,996**	**$ 730,927**	**$ 862,657**	**$ 2,362,580**

Extra

Sheets that you hide by setting the `Visible` property to `False` are still accessible to users from within Excel. To see which sheets are hidden in a workbook, on the Home tab, click Format ➔Hide & Unhide ➔Unhide Sheet. The Unhide dialog box appears, listing all of the sheets that you have hidden. To unhide a sheet, click the sheet and then click OK. This is equivalent to setting the `Visible` property for a sheet to `True`.

There are three `XlSheetVisibility` constant values. You can use them to set the visibility status of a sheet.

CONSTANT VALUE	FUNCTION
xlSheetHidden	Hides a sheet. The user can use the Ribbon to unhide the sheet.
xlSheetVeryHidden	Hides a sheet. The user cannot use the Ribbon to unhide the sheet.
xlSheetVisible	Displays a sheet.

Example:

```
Sheets("Formulas").Visible = xlSheetVeryHidden
```

Change the Name of a Sheet

It you have a number of sheets in a workbook, naming your sheets enables your users to determine which sheet they want to access. For example, if you keep your budget on a sheet named Budget and your sales figures on a sheet named Sales, when a user opens your workbook, they can quickly determine the sheet they want to access.

To change the name of a sheet in a workbook, use the `Name` property of the `Sheets` object. By default, Excel names all worksheets Sheet#, replacing # with the order in which you add the sheet to your workbook. For example, a typical workbook contains three worksheets: Sheet1, Sheet2, and Sheet3. If you add a worksheet, Excel names it Sheet4. Excel uses the name Chart# for chart sheets. Again, Excel assigns chart sheets numbers, based on the order in which you add them, with the first chart sheet being Chart1. Macro sheets and dialog sheets have the same naming conventions. Excel names the first macro sheet you add to a workbook Macro1 and the first dialog sheet Dialog1.

You can change the name of a sheet by assigning a name to the `Name` property of the `Sheet` object. For example, the following code changes the name of Sheet1 to Budget:

```
Sheets(1).Name = "Budget"
```

You can assign a string or a variable to the `Name` property. You can determine what the current name of a sheet is by assigning the `Name` property to a variable, as in the following example:

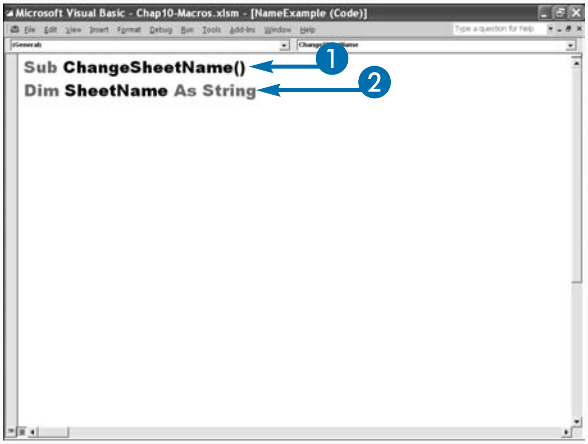
```
StringName = Sheets(1).Name
```

This example returns the name of `Sheet(1)` to the variable `StringName`.

Change the Name of a Sheet

① Name your procedure.

② Declare your variables.


Microsoft Visual Basic - Chap10-Macros.xlsm - [NameExample (Code)]
(General)
ChangeSheetName
1
2

```
Sub ChangeSheetName()
Dim SheetName As String
```

③ Create an input box.

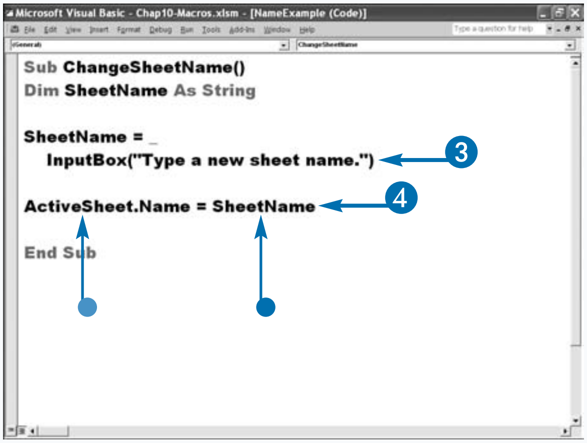
The users enter the name they want to change the active sheet to into the input box, and VBA stores the name to a variable.

④ Create a `Name` command to rename the sheet.

- The variable containing the name the user wants to give to worksheet.
- The sheet to be renamed.

In this example, the code is renaming the active sheet.

⑤ Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap10-Macros.xlsm - [NameExample (Code)]
(General)
ChangeSheetName
3
4

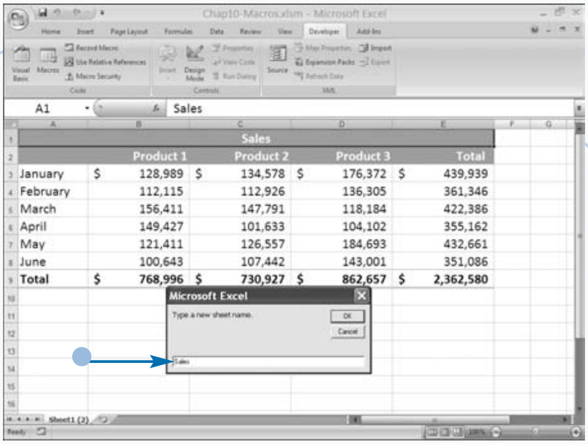
```
Sub ChangeSheetName()
Dim SheetName As String

SheetName = _
   InputBox("Type a new sheet name.")

ActiveSheet.Name = SheetName

End Sub
```

- The macro displays a message box requesting the name the user wants to give the active sheet.


Chap10-Macros.xlsm - Microsoft Excel
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Record Macro
Use Relative References
Macro Security
Code
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Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
A1
Sales
Sheet1 (2)
Ready

Sales				
	Product 1	Product 2	Product 3	Total
January	$ 128,989	$ 134,578	$ 176,372	$ 439,939
February	112,115	112,926	136,305	361,346
March	156,411	147,791	118,184	422,386
April	149,427	101,633	104,102	355,162
May	121,411	126,557	184,693	432,661
June	100,643	107,442	143,001	351,086
Total	**$ 768,996**	**$ 730,927**	**$ 862,657**	**$ 2,362,580**

Microsoft Excel

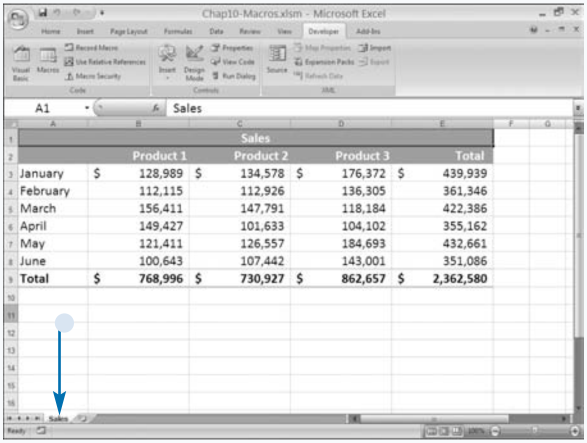
Type a new sheet name.

OK

Cancel

Sales

- The macro renames the sheet.


Chap10-Macros.xlsm - Microsoft Excel
Home
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Page Layout
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Developer
Add-Ins
Visual Basic
Macros
Record Macro
Use Relative References
Macro Security
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
A1
Sales
Sales
Ready

Sales				
	Product 1	Product 2	Product 3	Total
January	$ 128,989	$ 134,578	$ 176,372	$ 439,939
February	112,115	112,926	136,305	361,346
March	156,411	147,791	118,184	422,386
April	149,427	101,633	104,102	355,162
May	121,411	126,557	184,693	432,661
June	100,643	107,442	143,001	351,086
Total	**$ 768,996**	**$ 730,927**	**$ 862,657**	**$ 2,362,580**

Extra

You can manually change the name of a sheet in Excel by clicking the Home tab and then selecting Format ➔ Rename Sheet. Excel highlights the sheet's name tab. You click the tab and type the new name. After you modify the name, click elsewhere on the sheet and Excel updates the sheet name.

Because users can easily modify the name of a worksheet, be careful when referencing sheet names with your macros. If you reference the name of a sheet that has a changed name, Excel returns an error message.

No matter what the sheets are named, Excel keeps track of them based on the order in which they exist within the `Sheets` collection. If you use Project Explorer to view the list of sheets in the workbook, you see listings of Sheet1, Sheet2, and so on, with the corresponding sheet name in parentheses.

You can also use the `Name` property in conjunction with the `Parent` property to determine the name of the workbook that contains the current sheet. To determine the name of the corresponding workbook, use the code `CurrentWB = ActiveSheet.Parent.Name`.

Save a Sheet to Another File

You can save any sheet to another file by using the `SaveAs` method with a `Sheets` collection object. The `SaveAs` method has eight parameters that tell VBA how to save the sheet: `FileName`, `FileFormat`, `Password`, `WriteResPassword`, `ReadOnlyRecommended`, `CreateBackup`, `AddToMru`, and `Local`.

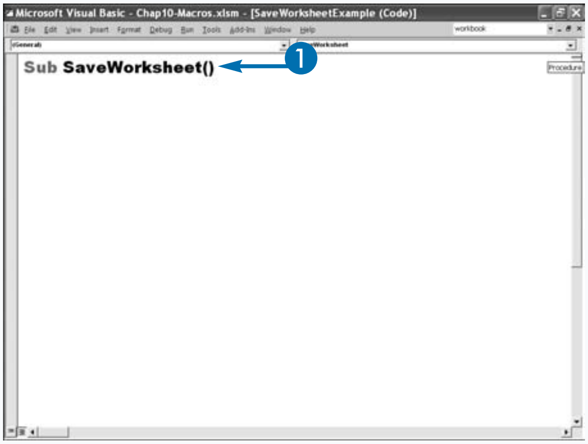
The `FileName` parameter is required. You use the `FileName` parameter to specify the name of the file you want to save the sheet to, and the folder in which you want to save the sheet. If you do not specify a path when you specify a filename, Excel saves the file in the current folder.

Use the `FileFormat` parameter to specify the file format in which you want to save the file. You can save in any file format supported by Excel, by using one of the `XlFileFormat` constant values. See Appendix A for a list of the `XlFileFormat` constant values. If you do not specify a file format, Excel uses the format that was previously used to save the file if the file was previously saved or the file format used by the current version of Excel is the file has never been saved. Use the `Password` parameter to specify a password of up to 15 characters for opening the file. Use the `WriteResPassword` parameter to restrict the file to open as Read-Only, unless the user has the password.

The remaining parameters accept the Boolean values `True` or `False`. You set `ReadOnlyRecommended` to `True` to display a message to the user when the file opens, suggesting that they open the file as Read-Only. You set `CreateBackup` to `True` to create a backup file; `AddToMru` to `True` to add the file to the Recent Documents list; `Local` to `True` if you want to save the file in the language used by Excel; and `Local` to `False` if you want to save the file in the language used by VBA.

Save a Sheet to Another File

① Name your procedure.


Microsoft Visual Basic - Chap10-Macros.xlsm - [SaveWorksheetExample (Code)]
(General)
Worksheet
1

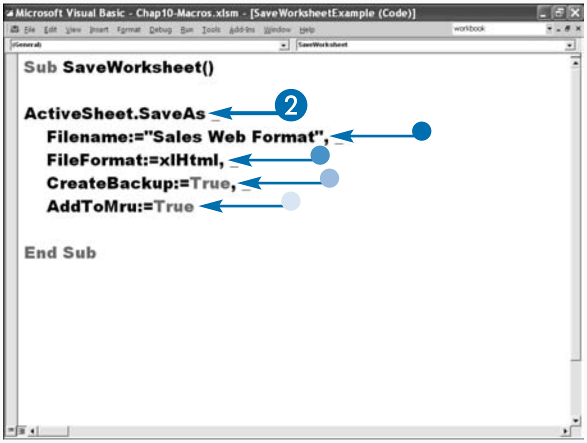
```
Sub SaveWorksheet()
```

② Create your `SaveAs` command.

- The name of the new file.
- The format in which you want to save the file.

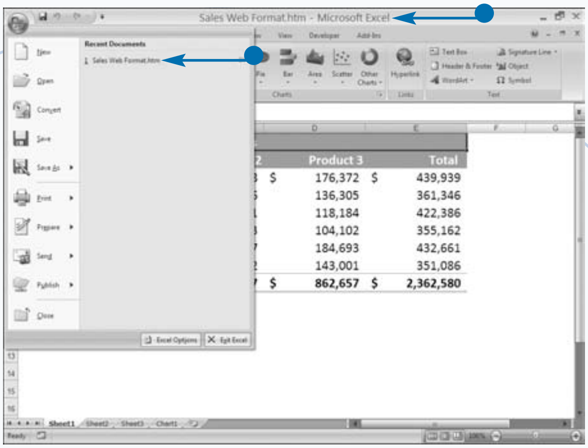
  This example saves the file in HTML format.
- Creates a backup.
- Adds the file to the Recent Documents list when the file is saved.

③ Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap10-Macros.xlsm - [SaveWorksheetExample (Code)]
(General)
SaveWorksheet
2

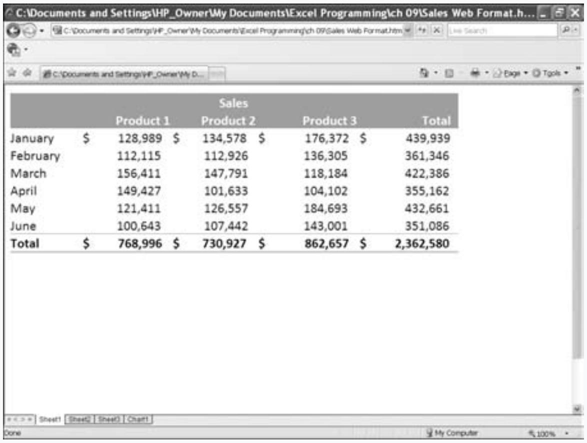
```
Sub SaveWorksheet()

ActiveSheet.SaveAs _
    Filename:="Sales Web Format", _
    FileFormat:=xlHtml, _
    CreateBackup:=True, _
    AddToMru:=True

End Sub
```

- The macro saves the file in HTML format, adds the file to the Recent Documents list, and creates a backup.


Sales Web Format.htm - Microsoft Excel
Recent Documents
1 Sales Web Format.htm
New
Open
Convert
Save
Save As
Print
Prepare
Send
Publish
Close
Excel Options
Exit Excel
View
Developer
Add-Ins
Pie
Bar
Area
Scatter
Other Charts
Charts
Hyperlink
Links
Text Box
Header & Footer
WordArt
Signature Line
Object
Symbol
Text
Sheet1
Sheet2
Sheet3
Chart1
Ready

	Product 3		Total
$	176,372	$	439,939
	136,305		361,346
	118,184		422,386
	104,102		355,162
	184,693		432,661
	143,001		351,086
$	**862,657**	$	**2,362,580**

The HTML file that the macro created, displayed in a browser.


C:\Documents and Settings\HP_Owner\My Documents\Excel Programming\ch 09\Sales Web Format.h...
C:\Documents and Settings\HP_Owner\My Documents\Excel Programming\ch 09\Sales Web Format.htm
Live Search
C:\Documents and Settings\HP_Owner\My D...
Page
Tools
Sheet1
Sheet2
Sheet3
Chart1
Done
My Computer
100%

		Sales					
		Product 1		Product 2		Product 3	Total
January	$	128,989	$	134,578	$	176,372	$ 439,939
February		112,115		112,926		136,305	361,346
March		156,411		147,791		118,184	422,386
April		149,427		101,633		104,102	355,162
May		121,411		126,557		184,693	432,661
June		100,643		107,442		143,001	351,086
Total	$	**768,996**	$	**730,927**	$	**862,657**	$ **2,362,580**

Extra

The `FileFormat` parameter accepts any of the `XlFileFormat` constant values that are listed in Appendix A. The list of available file formats is rather extensive. You can save a worksheet to another workbook by specifying the `xlWorkbookNormal` constant. This constant creates a new workbook based on the default workbook format for the current version of Excel. If you need to save the workbook in a format used by an earlier version of Excel, you need to specify the appropriate format parameter. For example, xlExcel5 saves the workbook in a format that you can open in Excel 5.0 or later. To save an Excel 2007 file in a macro-enabled format, use `xlOpenXMLWorkbookMacroEnabled`.

Protect a Worksheet

Protecting your worksheet enables users to make certain types of changes while disallowing others. For example, you can allow users to make changes to formats; insert or delete columns, rows, or hyperlinks; sort; filter; use PivotTables; and edit objects or scenarios.

You use the `Worksheet.Protect` method to protect a worksheet. The `Worksheet.Protect` method has several parameters, all of which are optional. With the exception of the `Password` parameter, you use the Boolean value `True` to activate a parameter and the Boolean value `False` to deactivate a parameter. The parameters are `Password`, `DrawingObjects`, `Contents`, `Scenarios`, `UserInterfaceOnly`, `AllowFormattingCells`, `AllowFormattingColumns`, `AllowFormattingRows`, `AllowInsertingColumns`, `AllowInsertingRows`, `AllowInsertingHyperlinks`, `AllowDeletingColumns`, `AllowDeletingRows`, `AllowSorting`, `AllowFiltering`, and `AllowUsingPivotTables`.

If you want to password-protect your worksheet, set the `Password` parameter to the password you want to use. You can use any string as a password, but remember passwords are case-sensitive. In other words, Excel interprets "Password" and "PASSWORD" differently.

Set the `DrawingObjects` parameter to `False` if you want the user to be able to modify shapes. The default value is `True`. By default, Excel protects locked cells, to remove this protection, set the `Contents` parameter to `False`. To unprotect scenarios, set the `Scenarios` parameter to `False`. If you set the `UserInterfaceOnly` parameter to `False`, Excel applies protection to macros and to the user interface. If you only want the user interface protected, set the `UserInterfaceOnly` parameter to `True`.

The remaining parameters are self-explanatory and they all have a default value of `False`. To allow any of these options, set the parameter to `True`.

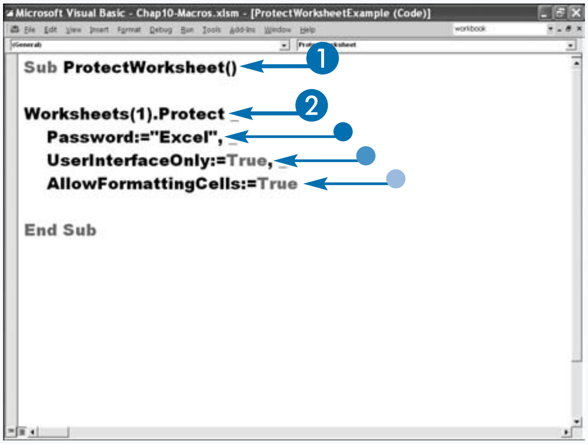
Protect a Worksheet

① Name your procedure.

② Create your `Protect` command.

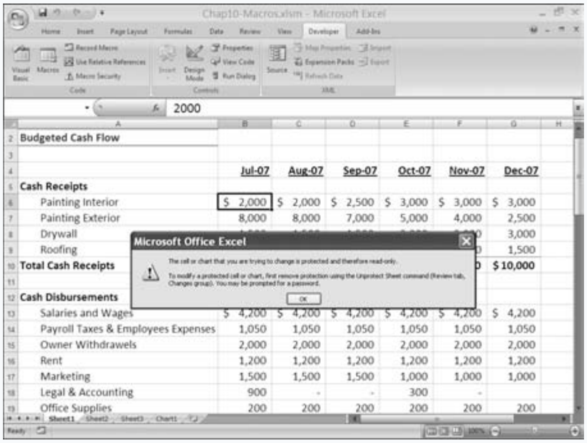
- Sets the password.
- Protects the user interface only.
- Allows format changes.

③ Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap10-Macros.xlsm - [ProtectWorksheetExample (Code)]
(General)
ProtectWorksheet
1
2

```
Sub ProtectWorksheet()

Worksheets(1).Protect _
    Password:="Excel", _
    UserInterfaceOnly:=True, _
    AllowFormattingCells:=True

End Sub
```

If the user tries to change a cell, Excel does not permit the change.


Chap10-Macros.xlsm - Microsoft Excel
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View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
Sheet1
Sheet2
Sheet3
Chart1
Ready
100%

2000

	Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07
Budgeted Cash Flow						
Cash Receipts						
Painting Interior	$ 2,000	$ 2,000	$ 2,500	$ 3,000	$ 3,000	$ 3,000
Painting Exterior	8,000	8,000	7,000	5,000	4,000	2,500
Drywall						3,000
Roofing						1,500
Total Cash Receipts						$ 10,000
Cash Disbursements						
Salaries and Wages	$ 4,200	$ 4,200	$ 4,200	$ 4,200	$ 4,200	$ 4,200
Payroll Taxes & Employees Expenses	1,050	1,050	1,050	1,050	1,050	1,050
Owner Withdrawels	2,000	2,000	2,000	2,000	2,000	2,000
Rent	1,200	1,200	1,200	1,200	1,200	1,200
Marketing	1,500	1,500	1,500	1,000	1,000	1,000
Legal & Accounting	900	-	-	300	-	
Office Supplies	200	200	200	200	200	200

Microsoft Office Excel

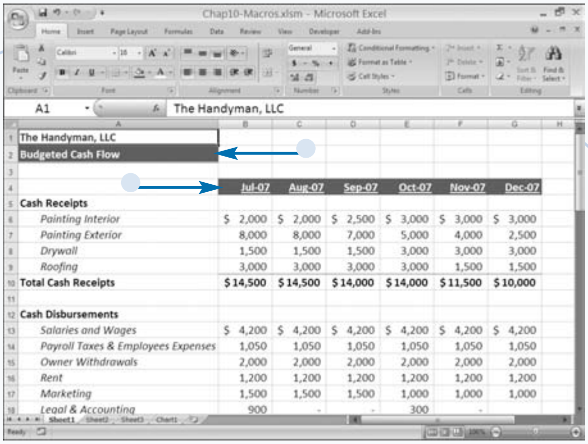
The cell or chart that you are trying to change is protected and therefore read-only.

To modify a protected cell or chart, first remove protection using the Unprotect Sheet command (Review tab, Changes group). You may be prompted for a password.

OK

The user can make permitted changes.

- In this example, the user can change the formats.



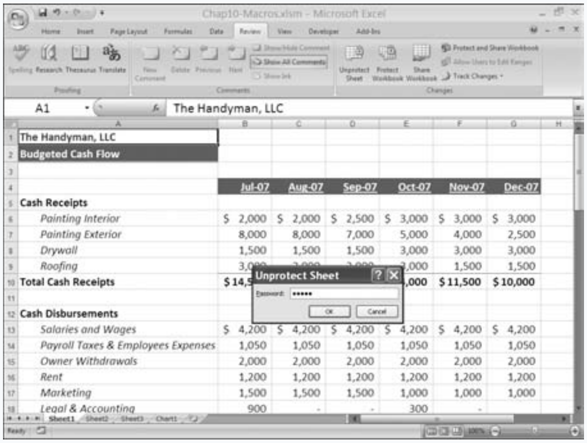
Chap10-Macros.xlsm - Microsoft Excel

A1 The Handyman, LLC

	A	B	C	D	E	F	G
1	The Handyman, LLC						
2	Budgeted Cash Flow						
3							
4		Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07
5	Cash Receipts						
6	Painting Interior	$ 2,000	$ 2,000	$ 2,500	$ 3,000	$ 3,000	$ 3,000
7	Painting Exterior	8,000	8,000	7,000	5,000	4,000	2,500
8	Drywall	1,500	1,500	1,500	3,000	3,000	3,000
9	Roofing	3,000	3,000	3,000	3,000	1,500	1,500
10	Total Cash Receipts	$ 14,500	$ 14,500	$ 14,000	$ 14,000	$ 11,500	$ 10,000
11							
12	Cash Disbursements						
13	Salaries and Wages	$ 4,200	$ 4,200	$ 4,200	$ 4,200	$ 4,200	$ 4,200
14	Payroll Taxes & Employees Expenses	1,050	1,050	1,050	1,050	1,050	1,050
15	Owner Withdrawals	2,000	2,000	2,000	2,000	2,000	2,000
16	Rent	1,200	1,200	1,200	1,200	1,200	1,200
17	Marketing	1,500	1,500	1,500	1,000	1,000	1,000
18	Legal & Accounting	900	-	-	300	-	

Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Sheet1
Sheet2
Sheet3
Chart1
Ready

If the user knows the password, they can enter the password to unprotect the worksheet.



Chap10-Macros.xlsm - Microsoft Excel

A1 The Handyman, LLC

	A	B	C	D	E	F	G
1	The Handyman, LLC						
2	Budgeted Cash Flow						
3							
4		Jul-07	Aug-07	Sep-07	Oct-07	Nov-07	Dec-07
5	Cash Receipts						
6	Painting Interior	$ 2,000	$ 2,000	$ 2,500	$ 3,000	$ 3,000	$ 3,000
7	Painting Exterior	8,000	8,000	7,000	5,000	4,000	2,500
8	Drywall	1,500	1,500	1,500	3,000	3,000	3,000
9	Roofing	3,0			,000	1,500	1,500
10	Total Cash Receipts	$ 14,5			,000	$ 11,500	$ 10,000
11							
12	Cash Disbursements						
13	Salaries and Wages	$ 4,200	$ 4,200	$ 4,200	$ 4,200	$ 4,200	$ 4,200
14	Payroll Taxes & Employees Expenses	1,050	1,050	1,050	1,050	1,050	1,050
15	Owner Withdrawals	2,000	2,000	2,000	2,000	2,000	2,000
16	Rent	1,200	1,200	1,200	1,200	1,200	1,200
17	Marketing	1,500	1,500	1,500	1,000	1,000	1,000
18	Legal & Accounting	900	-	-	300	-	

Unprotect Sheet

Password: •••••

OK
Cancel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Protect and Share Workbook
Show All Comments
Sheet1
Sheet2
Sheet3
Chart1
Ready

Extra

After you password-protect a worksheet, a user can unprotect the worksheet by clicking the Review tab, clicking Unprotect Sheet in the Changes group, and then typing the correct password in the Unprotect Sheet dialog box that appears.

You can unprotect the worksheet from within a procedure by using the `Unprotect` method. The only parameter the `Unprotect` method takes is the `Password` parameter. You set this parameter to the worksheet password.

Example:

```
ActiveSheet.Unprotect Password:="Excel"
```

This example unprotects the active worksheet by passing it the correct password. Remember to keep track of the passwords that you have assigned to worksheets. If you lose your password, you cannot access the password-protected document.

Protect a Chart

You can use the `Chart.Protect` method to protect a chart so that a user cannot modify it. The `Chart.Protect` method takes several parameters that enable you to determine the type of protection you want to assign to the chart. All of the parameters are optional. With the exception of the `Password` parameter, you use the Boolean value `True` to activate a parameter and the Boolean value `False` to deactivate a parameter. The following is the syntax for the `Chart.Protect` method:

```
expression.Protect(Password, DrawingObjects,
Contents, UserInterfaceOnly)
```

The `expression` parameter identifies the chart you want to protect. If you want to password-protect your chart, you can set the `Password` parameter to the password you want to use. You can use any string as a password, but remember that passwords are case-sensitive. In other words, Excel interprets "Password" and "PASSWORD" differently.

If you set the `DrawingObjects` parameter to `False`, the user can add shapes to your chart and modify the shapes in your chart. The default value is `True`. If you set the `Contents` parameter to `False`, the user can modify the chart. If you set the `UserInterfaceOnly` parameter to `False`, Excel applies protection to macros and to the user interface. If you only want the user interface protected, set the `UserInterfaceOnly` parameter to `True`.

To unprotect a chart using a procedure, use the `Unprotect` method. You must include the password if the chart is password-protected, as follows:

```
Charts(1).Unprotect Password:="Excel"
```

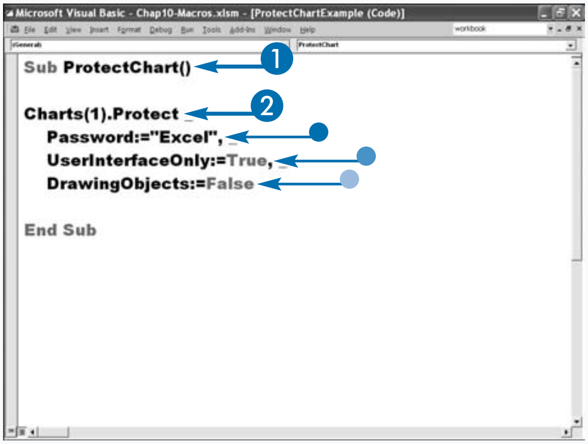
Protect a Chart

① Name your procedure.

② Create your `Protect` command.

- Sets the password.
- Protects the user interface only.
- Allows the user to draw objects.

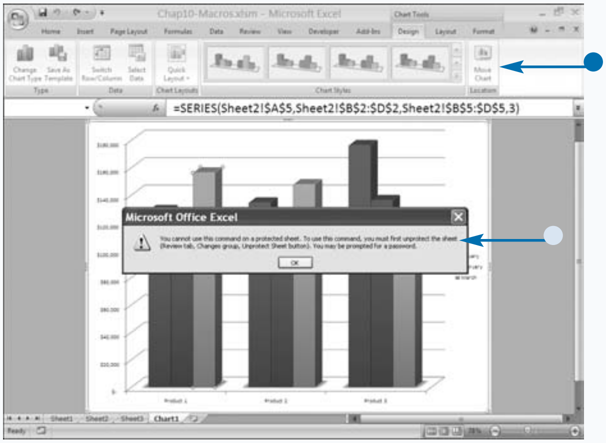
③ Press Alt+F11 to switch from the VBE to Excel, and run the macro.



Microsoft Visual Basic - Chap10-Macros.xlsm - [ProtectChartExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
ProtectChart
1
2

```
Sub ProtectChart()

Charts(1).Protect _
    Password:="Excel", _
    UserInterfaceOnly:=True, _
    DrawingObjects:=False

End Sub
```

- If the user tries to make a change that your macro does not permit, Excel does not allow the user to make the change.
- Excel grays out the Ribbon options to indicate that they are not available.



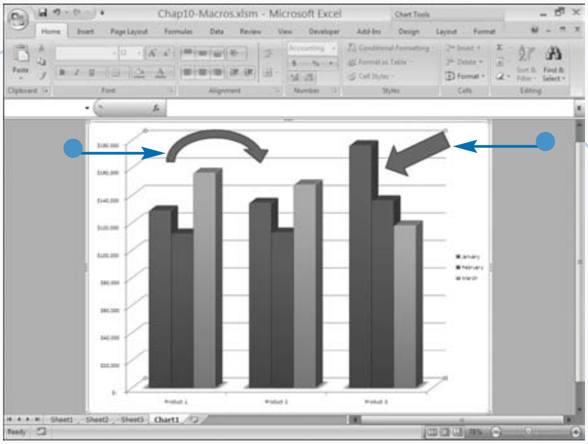
Chap10-Macros.xlsm - Microsoft Excel
Chart Tools
Home Insert Page Layout Formulas Data Review View Developer Add-Ins Design Layout Format
Change Chart Type
Save As Template
Switch Row/Column
Select Data
Quick Layout
Move Chart
Type Data Chart Layouts Chart Styles Location
Sheet1 Sheet2 Sheet3 Chart1
Ready
Microsoft Office Excel
OK

=SERIES(Sheet2!$A$5,Sheet2!$B$2:$D$2,Sheet2!$B$5:$D$5,3)

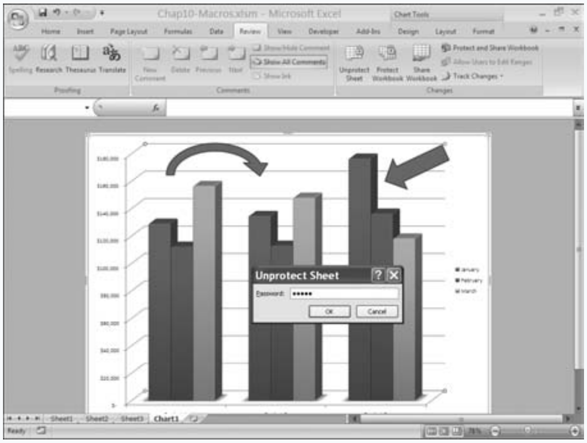
You cannot use this command on a protected sheet. To use this command, you must first unprotect the sheet (Review tab, Changes group, Unprotect Sheet button). You may be prompted for a password.

The user can make permitted changes.

- In this example, the user can add shapes.


Chap10-Macros.xlsm - Microsoft Excel
Chart Tools
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Design
Layout
Format
Sheet1
Sheet2
Sheet3
Chart1
Ready

If the user knows the password, they can enter the password to unprotect the worksheet.


Chap10-Macros.xlsm - Microsoft Excel
Chart Tools
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Design
Layout
Format
Unprotect Sheet
Protect Sheet
Share Workbook
Protect and Share Workbook
Allow Users to Edit Ranges
Track Changes
Sheet1
Sheet2
Sheet3
Chart1
Ready

Unprotect Sheet

Password: •••••

OK Cancel

Apply It

VBA provides properties that you can use with `Worksheet` and `Chart` objects to determine if parts of a sheet are protected. This helps eliminate errors caused by attempting to modify a protected sheet. Each of these properties is Read-Only.

PROPERTY	DESCRIPTION
`ProtectContents`	Returns a value of `True` if the sheet is protected. For a chart, the property looks to see if the entire chart is protected. For a worksheet, the property looks to see if the cells are protected. To turn off this property, set the `Contents` parameter of the `Protect` method to `False`.
`ProtectDrawingObjects`	Returns a value of `True` if the shapes in the sheet are protected. To turn off this property, set the `DrawingObjects` parameter of the `Protect` method to `False`.
`ProtectScenarios`	Returns a value of `True` if the scenarios are protected. To turn off this property, set the `Scenarios` parameter of the `Protect` method to `False`.
`ProtectionMode`	Returns a value of `True` if the user interface is protected.

Print a Sheet

You can use the `PrintOut` method to create a procedure to print the contents of a sheet. The `PrintOut` method has several parameters for specifying how Excel prints the sheet: `From`, `To`, `Copies`, `Preview`, `ActivePrinter`, `PrintToFile`, `Collate`, and `PrToFileName`.

Use the `From` and `To` parameters to indicate the range of pages within the specified sheet that you want to print. Indicate the page number of the first page to print as the value of the `From` parameter, and the page number of the last page as the value of the `To` parameter. If you omit these parameters, Excel prints the entire sheet.

By default, Excel prints one copy of the sheet. For multiple copies, use the `Copies` parameter to indicate the desired number. You can specify a value of `True` for the `Collate` parameter to have Excel collate the copies.

If you want the Excel preview window to show the contents of the print selection, set the value of the `Preview` parameter to `True`. The Print button on the Print Preview screen prints the copy, and the Close button cancels the print.

To specify a printer, use the `ActivePrinter` parameter. If you do not set the `ActivePrinter` parameter, VBA uses the computer's default printer.

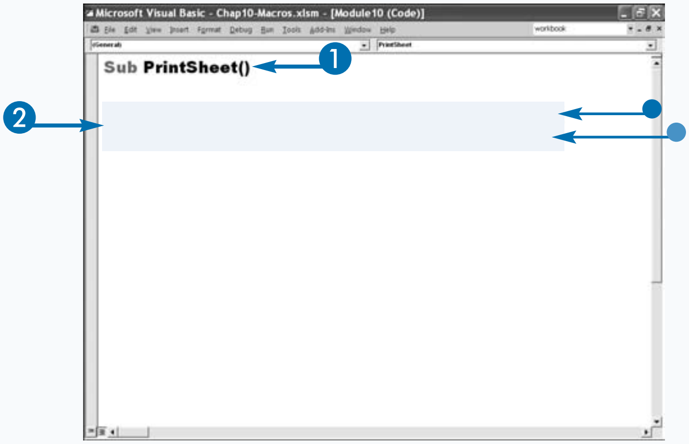
You can send the printout to a file instead of a printer by setting the `PrintToFile` parameter to `True`, and specifying the name of the file to which you want to send the printout by using the `PrToFileName` parameter. If you do not specify a filename, Excel prompts you for one when your procedure runs.

Print a Sheet

① Name your procedure.

② Set up your page.

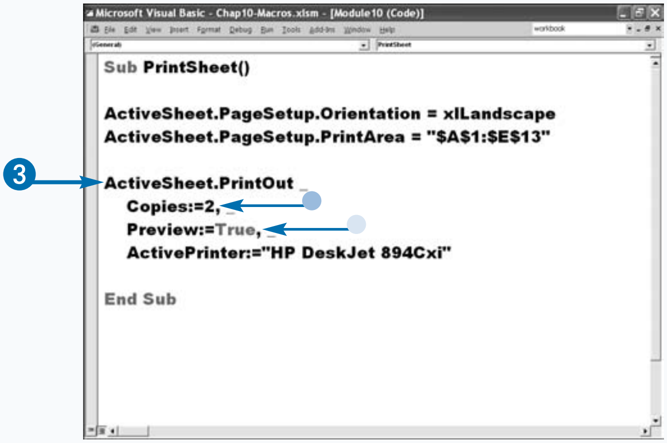
- Sets the orientation to landscape.
- Sets the print area.


Microsoft Visual Basic - Chap10-Macros.xlsm - [Module10 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
workbook
(General)
PrintSheet
1
2

```
Sub PrintSheet()
```

③ Create your `PrintOut` command.

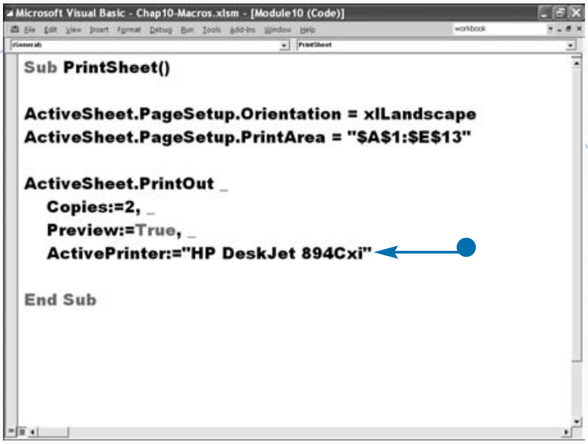
- The number of copies to print.
- Displays the Print Preview before printing.


Microsoft Visual Basic - Chap10-Macros.xlsm - [Module10 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
workbook
(General)
PrintSheet
3

```
Sub PrintSheet()

ActiveSheet.PageSetup.Orientation = xlLandscape
ActiveSheet.PageSetup.PrintArea = "$A$1:$E$13"

ActiveSheet.PrintOut _
    Copies:=2, _
    Preview:=True, _
    ActivePrinter:="HP DeskJet 894Cxi"

End Sub
```

- The printer to which you want to send the report.

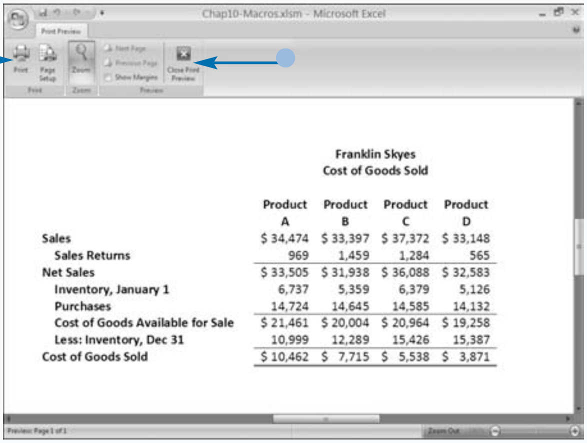
4. Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap10-Macros.xlsm - [Module10 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
workbook
(General)
PrintSheet

```
Sub PrintSheet()

ActiveSheet.PageSetup.Orientation = xlLandscape
ActiveSheet.PageSetup.PrintArea = "$A$1:$E$13"

ActiveSheet.PrintOut _
   Copies:=2, _
   Preview:=True, _
   ActivePrinter:="HP DeskJet 894Cxi"

End Sub
```

The macro displays the Print Preview screen.

- The Print button prints the file.
- The Close button cancels the printing.


Chap10-Macros.xlsm - Microsoft Excel
Print Preview
Print
Page Setup
Zoom
Next Page
Previous Page
Show Margins
Close Print Preview
Print
Zoom
Preview
Preview: Page 1 of 1
Zoom Out

Franklin Skyes
Cost of Goods Sold

	Product A	Product B	Product C	Product D
Sales	$ 34,474	$ 33,397	$ 37,372	$ 33,148
Sales Returns	969	1,459	1,284	565
Net Sales	$ 33,505	$ 31,938	$ 36,088	$ 32,583
Inventory, January 1	6,737	5,359	6,379	5,126
Purchases	14,724	14,645	14,585	14,132
Cost of Goods Available for Sale	$ 21,461	$ 20,004	$ 20,964	$ 19,258
Less: Inventory, Dec 31	10,999	12,289	15,426	15,387
Cost of Goods Sold	$ 10,462	$ 7,715	$ 5,538	$ 3,871

Apply It

You can set a print area for a worksheet by using the `PageSetup` object with the `PrintArea` property. Assign the `PrintArea` property a range of cells as the print area. For example, `ActiveSheet.PageSetup.PrintArea = "$A$1:$E$9"` sets the range of cells in the print area from A1 to E9. If cells outside that range contain data, Excel does not print them.

When you use the `PrintArea` property to set the range of cells to print, you can omit the `From` and `To` parameters of the `PrintOut` method. To clear the print area, assign the `PrintArea` property a value of `False` or an empty string. Both of the following lines of code clear the print area:

Examples:

```
ActiveSheet.PageSetup.PrintArea = False
ActiveSheet.PageSetup.PrintArea = " "
```

When printing, you can set the orientation by using the `PageSetup` object with the `Orientation` property. Use the `xlLandscape` constant value to set the orientation to landscape. Use the `xlPortrait` constant value to set the orientation to portrait.

Sort Worksheets by Name

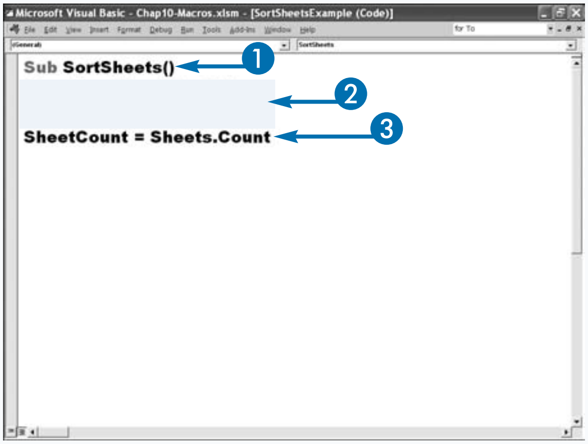
You can use VBA to sort worksheets in a workbook based on the worksheet names. When you first create a new workbook, Excel lists the sheets in order: Sheet1, Sheet2, Sheet3. However, as you add sheets, the order of the sheets can change dramatically. For example, if your active sheet is Sheet2 and you instruct Excel to add a new sheet, Excel adds it before Sheet2 and names it Sheet4, making the order of your sheets Sheet1, Sheet4, Sheet2, Sheet3.

You can easily resolve this problem by manually renaming or moving the sheets within the workbook. Alternatively, you can create a procedure that sorts the worksheets and lists them in alphabetical order. You start by using the `Count` property to determine the number of sheets in the workbook. When you know the number of sheets in a workbook, you can use a For Next loop to cycle through the sheets so that Excel can compare the names and place the sheets in order. You use nested looping, which is the process of placing one loop inside another loop. The inside loop executes completely, and then control returns to the outside loop. See Chapter 6 for more information on using `For Next` loops.

Within the second `For Next` loop, use an `If Then` statement to compare the name of a sheet to the sheet that is currently considered the alphabetically lowest sheet name. If the compared name is alphabetically lower, it becomes the new alphabetically lowest name. Excel does an alphabetical comparison when you are working with strings.

Sort Worksheets by Name

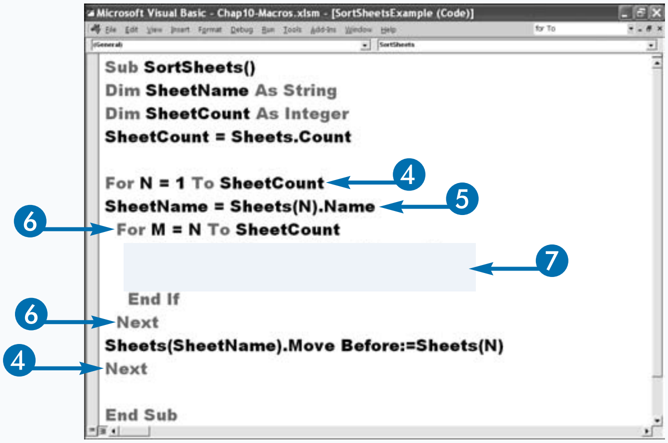
1. Name your procedure.
2. Declare your variables.
3. Count the number of sheets.


Microsoft Visual Basic - Chap10-Macros.xlsm - [SortSheetsExample (Code)]
(General)
SortSheets
1
2
3

```
Sub SortSheets()

SheetCount = Sheets.Count
```

4. Create a `For Next` loop to loop through each index position.
5. Store the name of the sheet with the index value of N to the variable `SheetName`.

   N starts at 1 and increments with each loop.
6. Create a `For Next` loop within the previous loop, assign the value of N to M, and loop through the total number of sheets, starting at the value of M.
7. If the name of the sheet with an index value of M is less than `SheetName`, store the name of the sheet with an index value of M to the variable `SheetName` and then keep looping; otherwise, do nothing and keep looping.


Microsoft Visual Basic - Chap10-Macros.xlsm - [SortSheetsExample (Code)]
(General)
SortSheets
4
5
6
7
6
4

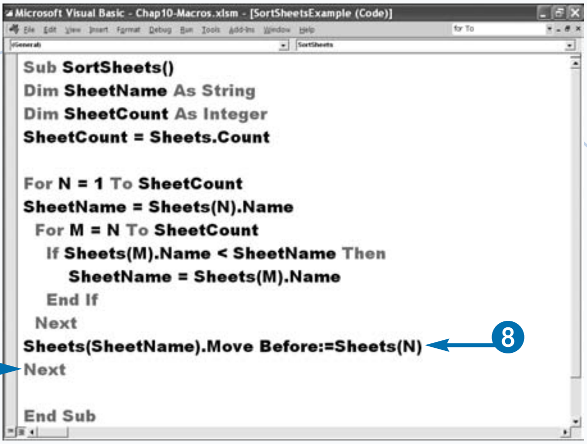
```
Sub SortSheets()
Dim SheetName As String
Dim SheetCount As Integer
SheetCount = Sheets.Count

For N = 1 To SheetCount
SheetName = Sheets(N).Name
 For M = N To SheetCount

   End If
 Next
Sheets(SheetName).Move Before:=Sheets(N)
Next

End Sub
```

When the loop has finished, `SheetName` contains the lowest value.

8. Move the sheet identified by the variable `SheetName` before the sheet with an index value of N.

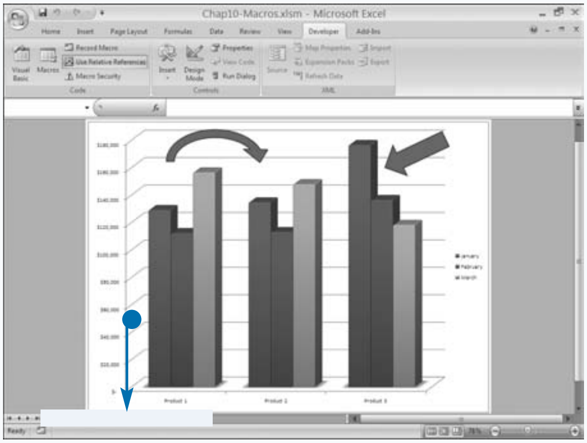
9. Move to the sheet with the next index value and perform the loop again.

10. Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap10-Macros.xlsm - [SortSheetsExample (Code)]
(General)
SortSheets
8
9

```
Sub SortSheets()
Dim SheetName As String
Dim SheetCount As Integer
SheetCount = Sheets.Count

For N = 1 To SheetCount
SheetName = Sheets(N).Name
 For M = N To SheetCount
  If Sheets(M).Name < SheetName Then
    SheetName = Sheets(M).Name
  End If
 Next
Sheets(SheetName).Move Before:=Sheets(N)
Next

End Sub
```

- The macro sorts the sheets.



Apply It

The steps in this section determine the sheet with the lowest name in the inside loop and place that sheet before the index value that it is evaluating. Although this code works correctly, it is not the most efficient method for sorting a large list of items. The code attempts to move the sheet without first checking to see if the smallest sheet is also the current sheet. To make the execution of the code more efficient, add a conditional `If Then` statement that compares the two sheets and performs the move only if they are not the same sheet. The code runs more effectively because it determines that no move is required if the sheets are already in the correct order.

TYPE THIS:

```
If Sheets(SheetName) <> Sheets(N) Then
    Sheets(SheetName). Move Before:=Sheets(N)
End If
```

RESULT:

This code checks that the sheet you are moving and the sheet before which you intend to move it are not the same sheet. If the sheets are the same, Excel ignores the Move statement and continues with the looping statements.

Using the Range Property

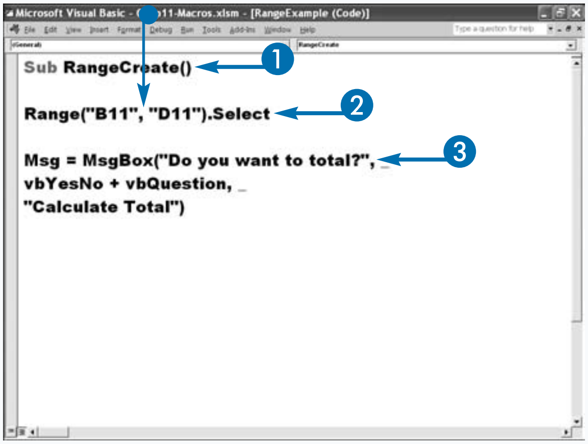
When working in Excel, a lot of the work that you do involves ranges. You can define a range by using the `Range` property. Defining a range creates a `Range` object, which can be a single cell, an entire column, a row, or a selection of multiple cells.

You can use the `Range` property with the `Application`, `Worksheet`, or `Range` objects. The statements `Application.Range` and `ActiveSheet.Range` return the same results. If you use the `Range` property without an object, Excel assumes you are referencing the `ActiveSheet`.

You can use two syntax forms with the `Range` property. The first form requires two parameters: `Cell1` and `Cell2`. This form of the `Range` object references the upper-left corner of the desired range with the `Cell1` parameter, and the lower-right corner of the range with the `Cell2` parameter. For example, to specify a range of cells between A1 and E15, you would use the code `Range("A1", "E15")`.

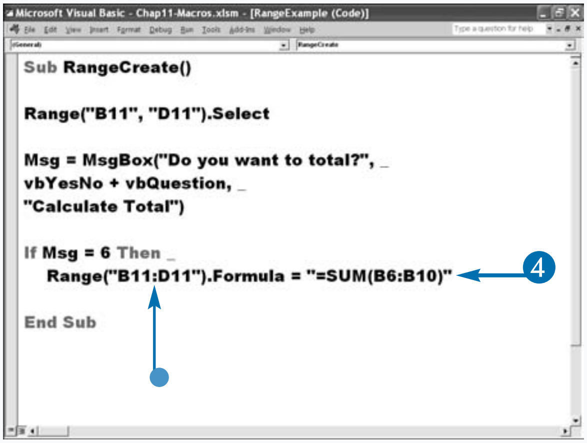
The other form of the `Range` property requires a `Name` parameter. This required parameter indicates a range, using the A1-style reference. You place a colon between two cells to specify a range. For example, `Range("A3:F5")` refers to the range of cells from A3 to F5. You place a comma between the range definitions to refer to two or more noncontiguous ranges. For example, `Range("A3, A1, B4:C10")` specifies the range of cells A3, A1, and B4 to C10. You leave a space between the two range definitions to specify the location where two ranges intersect. For example, `Range("A3:F3 D2:G5")` specifies where the range of cells A3 to F3 intersects with the range of cells D2 to G5.

Using the Range Property


Microsoft Visual Basic - Chap11-Macros.xlsm - [RangeExample (Code)]
(General)
RangeCreate
1
2
3

```
Sub RangeCreate()

Range("B11", "D11").Select

Msg = MsgBox("Do you want to total?", _
vbYesNo + vbQuestion, _
"Calculate Total")
```

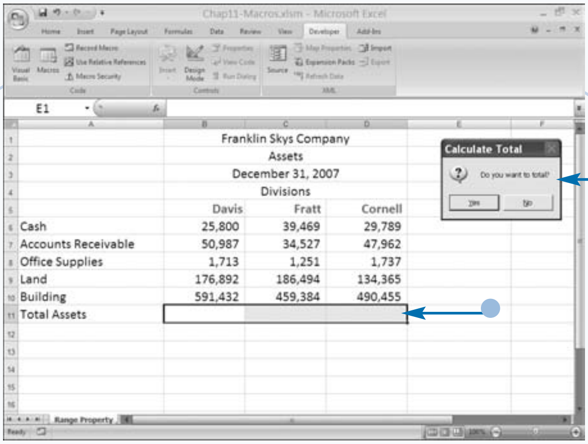
1. Name your procedure.
2. Define a range and select it.
   - The range.
3. Ask the user if they want to calculate a total.


Microsoft Visual Basic - Chap11-Macros.xlsm - [RangeExample (Code)]
(General)
RangeCreate
4

```
Sub RangeCreate()

Range("B11", "D11").Select

Msg = MsgBox("Do you want to total?", _
vbYesNo + vbQuestion, _
"Calculate Total")

If Msg = 6 Then _
   Range("B11:D11").Formula = "=SUM(B6:B10)"

End Sub
```

4. If the user responds, "Yes," then calculate the total.
   - This same range was selected in step 1 using a different syntax.
5. Press Alt+F11 to switch from the VBE to Excel, and run the macro.

- The macro selects the range and then displays a message box.


Chap11-Macros.xlsm - Microsoft Excel
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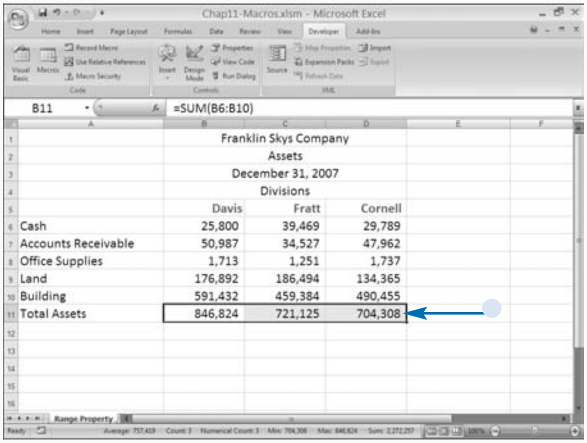
Macros
Record Macro
Use Relative References
Macro Security
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
E1
Range Property
Ready
Calculate Total
Yes
No

Do you want to total?

	A	B	C	D
1		Franklin Skys Company		
2		Assets		
3		December 31, 2007		
4		Divisions		
5		Davis	Fratt	Cornell
6	Cash	25,800	39,469	29,789
7	Accounts Receivable	50,987	34,527	47,962
8	Office Supplies	1,713	1,251	1,737
9	Land	176,892	186,494	134,365
10	Building	591,432	459,384	490,455
11	Total Assets			

- If the user clicks the Yes button, the macro totals the columns.


Chap11-Macros.xlsm - Microsoft Excel
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Macros
Record Macro
Use Relative References
Macro Security
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
B11
Range Property
Ready

=SUM(B6:B10)

	A	B	C	D
1		Franklin Skys Company		
2		Assets		
3		December 31, 2007		
4		Divisions		
5		Davis	Fratt	Cornell
6	Cash	25,800	39,469	29,789
7	Accounts Receivable	50,987	34,527	47,962
8	Office Supplies	1,713	1,251	1,737
9	Land	176,892	186,494	134,365
10	Building	591,432	459,384	490,455
11	Total Assets	846,824	721,125	704,308

Average: 757,419 Count: 3 Numerical Count: 3 Min: 704,308 Max: 846,824 Sum: 2,272,257

Extra

To highlight a cell or range of cells in a worksheet, use the `Select` method with a Range object. For example, to select the range of cells from A3 to A6, you would type **Range("A3:A6").Select**.

When you use the `Select` method with a `Range` object, the active cell becomes the first cell in the specified range. If you specify individual cells with the `Select` method, the active cell is the first cell specified. For example, `Range("A3, A1, A5").Select` makes cell A3 the active cell.

You can also use the `Activate` method to highlight a cell or range of cells. With the `Activate` method, the first cell referenced in the range is the active cell, but VBA highlights all of the other cells in the range to indicate that VBA has selected them as well. For example, the code `Range("B4:C6").Activate`, makes B4 the active cell and highlights cells B4 to C6. When you use the `Activate` method, the first cell in the range becomes the active cell. The `Select` method and the `Activate` method are interchangeable.

Using the Cells Property

You can use the `Cells` property to reference specific cells in a worksheet and make changes to the values or properties of the cells, such as the font settings. The Excel object model does not contain a `Cells` object. To reference specific cells, use either the `Cells` property or the `Range` property, each of which returns a `Range` object with the specified cells. See the section, “Using the Range Property,” for more information about the `Range` property.

You can use the `Cells` property with the `Application`, `Range`, and `Worksheet` objects. Using the `Cells` property with the `Application` and `Worksheet` objects returns the same result. For example, you can type `Application.Cells`, or `ActiveSheet.Cells` to return a `Range` object containing all cells in the active worksheet.

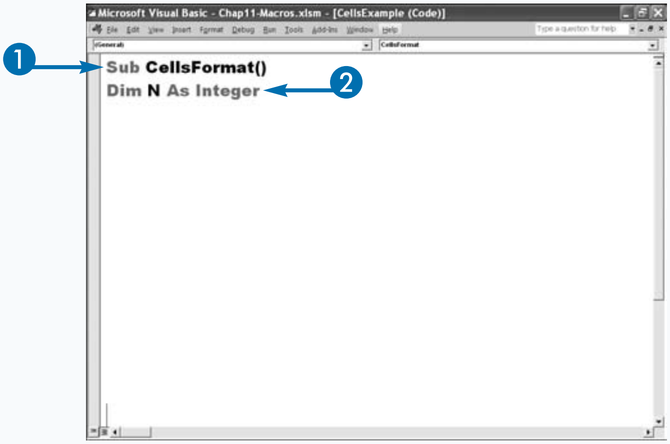
The `Cells` property has two parameters. The first parameter, `Row`, contains a value indicating the row index. The second parameter, `Column`, contains a value indicating the column index. For example, to reference cell B5, you assign a value of 5 for the row parameter and a value of 2 for the column parameter, as shown in the code `Cells(5,2)`.

One advantage of using the `Cells` property instead of the `Range` property is that you can use variables to change the values easily. For example, you can use a variable to represent either the row or column, as shown in the code `Cells(N,1) = 5`. which sets the value of a cell in column A and a row specified by N to 5.

Using the Cells Property

① Name your procedure.

② Declare your variable.



Microsoft Visual Basic - Chap11-Macros.xlsm - [CellsExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Type a question for help
(General)
CellsFormat
1
2

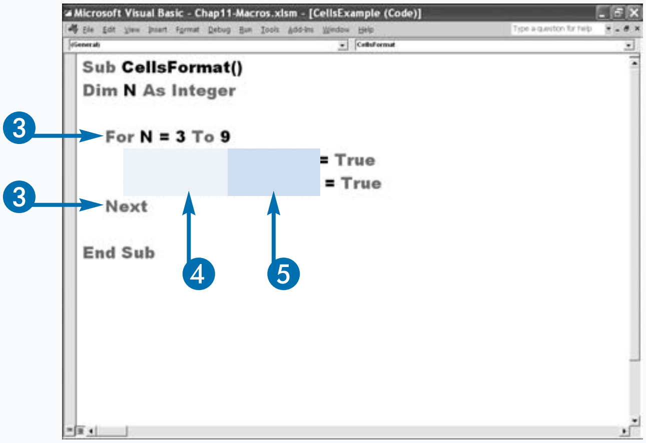
```
Sub CellsFormat()
Dim N As Integer
```

③ Create a `For Next` loop.

④ Use the Cells property to indicate the cells you want to format.

⑤ Format the cells.

⑥ Press Alt+F11 to switch from the VBE to Excel, and run the macro.



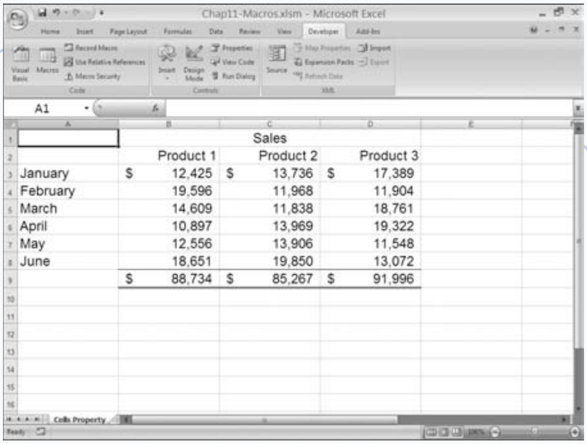
Microsoft Visual Basic - Chap11-Macros.xlsm - [CellsExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Type a question for help
(General)
CellsFormat
3
3
4
5

```
Sub CellsFormat()
Dim N As Integer

    For N = 3 To 9
                          = True
                           = True
    Next

End Sub
```

The worksheet before you run your macro.


Chap11-Macros.xlsm - Microsoft Excel
Home
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Review
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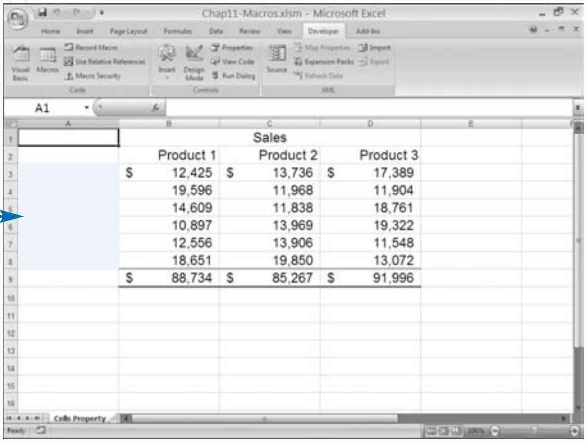
Developer
Add-Ins
A1
Cells Property
Ready

		Sales	
	Product 1	Product 2	Product 3
January	$ 12,425	$ 13,736	$ 17,389
February	19,596	11,968	11,904
March	14,609	11,838	18,761
April	10,897	13,969	19,322
May	12,556	13,906	11,548
June	18,651	19,850	13,072
	$ 88,734	$ 85,267	$ 91,996

The worksheet after you run your macro.

- The macro moves down the first column and adds bold and italic formatting to each cell.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View
Developer
Add-Ins
A1
Cells Property
Ready

		Sales	
	Product 1	Product 2	Product 3
	$ 12,425	$ 13,736	$ 17,389
	19,596	11,968	11,904
	14,609	11,838	18,761
	10,897	13,969	19,322
	12,556	13,906	11,548
	18,651	19,850	13,072
	$ 88,734	$ 85,267	$ 91,996

Extra

To set the font attributes for objects in Excel, use the `Font` object. You typically use the `Font` object to modify the attributes of a cell or a range of cells. The `Font` object has several properties for obtaining or modifying the attributes of a specified object. Some of these properties are listed in the following table.

FONT PROPERTY	DESCRIPTION
`Bold`	A Boolean value indicating whether the font for the object is bold.
`Color`	Indicates the color of the font. Use the RGB function to set the font color.
`FontStyle`	Indicates the font style. For example, to set both a bold and an underline font style, specify Font.FontStyle = "Bold Underline".
`Italic`	A Boolean value indicating whether the font for the object is italic.
`Shadow`	A Boolean value indicating whether the font is a shadow font.
`Size`	Indicates the size of the font.
`Strikethrough`	A Boolean value indicating whether to use a strikethrough font to draw a horizontal line through each character.
`Subscript`	A Boolean value indicating whether the font is subscript.
`Superscript`	A Boolean value indicating whether the font is superscript.
`Underline`	A Boolean value indicating whether the font is underlined.

Combine Multiple Ranges

To create a multiple area range, you can use the `Union` method. A multiple area range contains more than one block of cells, and the blocks of cells are noncontiguous. For example, you can use the `Union` method to create a `Range` object containing the cells A1 to B5 and D1 to E5.

When you use the `Range` property in conjunction with the `Union` method, you can specify up to 30 ranges, and you must specify at least two ranges. You assign the ranges by using any option that returns a valid `Range` object, such as the `Range` property or the `Cells` property. See the sections, "Using the Range Property" and "Using the Cells Property," for more information. The following example specifies two ranges:

```
Dim RangeVar As Range
Set RangeVar = Union (Range("A1:A3"),
Range("A5:A15"))
```

The code `Set RangeVar = Union (Range("A1:A3"), Range("A5:A15"))` uses the `Union` method to combine two Range objects created with the `Range` property and assigns the result to a range object variable. With this sample code, the new range contains the cells A1 to A3 and A5 to A15. Notice that the two blocks of cells are noncontiguous.

Because you must declare the variable to which you assign the multi-area range as a `Range` object, you use the `Set` statement when creating the assignment statement. You must use the `Set` statement whenever you assign an object to an object variable. See Chapter 4 for more information on assigning objects to variables.

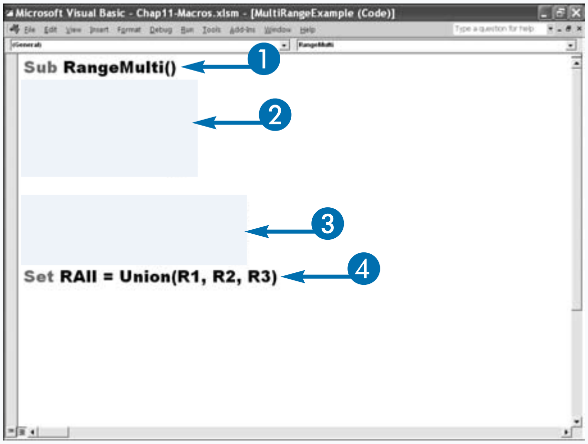
Combine Multiple Ranges

① Name your procedure.

② Declare the Range object variables that you will use to store your ranges.

③ Store each range to a variable.

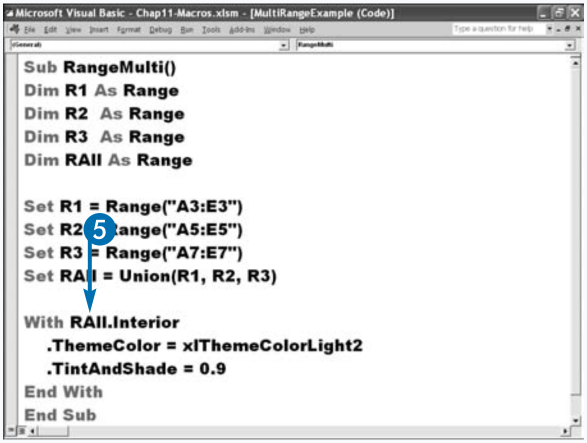
④ Use the Union method to create a single range object that contains multiple ranges.


Microsoft Visual Basic - Chap11-Macros.xlsm - [MultiRangeExample (Code)]
(General)
RangeMulti
1
2
3
4

```
Sub RangeMulti()

Set RAll = Union(R1, R2, R3)
```

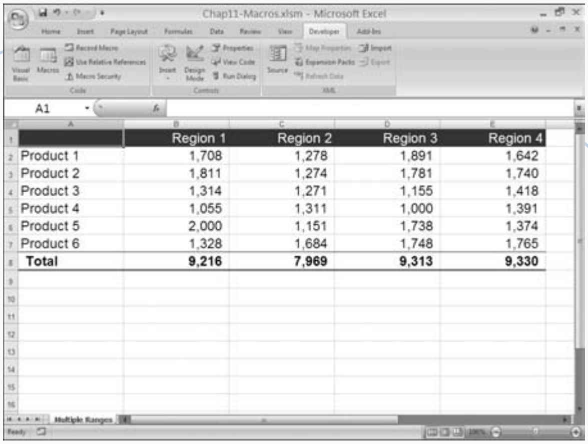
⑤ Apply formats to multiple ranges using one Range object.

⑥ Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap11-Macros.xlsm - [MultiRangeExample (Code)]
(General)
RangeMulti
5

```
Sub RangeMulti()
Dim R1 As Range
Dim R2  As Range
Dim R3  As Range
Dim RAll As Range

Set R1 = Range("A3:E3")
Set R2 = Range("A5:E5")
Set R3 = Range("A7:E7")
Set RAll = Union(R1, R2, R3)

With RAll.Interior
   .ThemeColor = xlThemeColorLight2
   .TintAndShade = 0.9
End With
End Sub
```

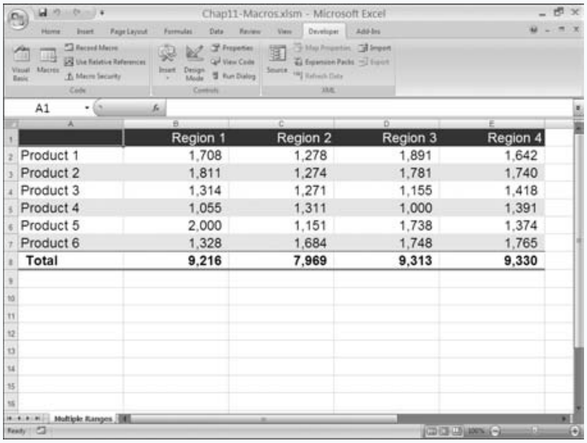
The worksheet before you run your macro.



	Region 1	Region 2	Region 3	Region 4
Product 1	1,708	1,278	1,891	1,642
Product 2	1,811	1,274	1,781	1,740
Product 3	1,314	1,271	1,155	1,418
Product 4	1,055	1,311	1,000	1,391
Product 5	2,000	1,151	1,738	1,374
Product 6	1,328	1,684	1,748	1,765
Total	**9,216**	**7,969**	**9,313**	**9,330**

The worksheet after you run your macro.

The macro uses a Union range to apply a format to multiple ranges.



	Region 1	Region 2	Region 3	Region 4
Product 1	1,708	1,278	1,891	1,642
Product 2	1,811	1,274	1,781	1,740
Product 3	1,314	1,271	1,155	1,418
Product 4	1,055	1,311	1,000	1,391
Product 5	2,000	1,151	1,738	1,374
Product 6	1,328	1,684	1,748	1,765
Total	**9,216**	**7,969**	**9,313**	**9,330**

Extra

When you use the `Union` method, you combine multiple ranges. Each range is a `Range` object and is part of the `Areas` collection. Each member of the `Areas` collection represents a contiguous block of cells, with one `Range` object representing each contiguous block of cells.

You cannot apply some VBA operations to ranges that contain multiple areas; therefore you may need to determine the number of areas in a range. To do this, use the `Count` property. The `Count` property counts the number of areas in the range; if the `Count` property returns a value greater than 1, the range contains more than one area. The following example uses the `Count` property to determine the number of areas in a range:

Example:

```
NewRange = Selection.Areas.Count
```

Each range in an `Areas` collection has an index value. The first range added to the collection has an index value of 1, the next 2, and so forth. You can reference an area by its index value.

Using the Offset Property

Using the `Offset` property is another way to specify a range of cells. The `Offset` property defines a range as an offset from another range, with the offset being the distance in rows and columns between the new range and the existing range.

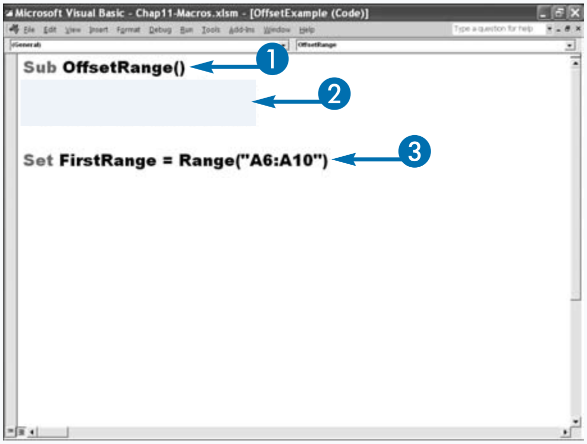
The `Offset` property has two parameters. Although both are optional, if you do not specify at least one of the parameters, the `Offset` property returns the current range. Use the `RowOffset` parameter to indicate the number of rows to offset the new range from the current range. A positive number offsets the range downward. A negative number offsets the range upward. The `Offset` property bases the offset on the upper-left cell in the active range. For example, if the active range is cells A1 to B4, the Offset property bases the offset values on the number of rows and columns from cell A1. Use the `ColumnOffset` parameter to specify the number of columns to offset the range from the current range. A positive number offsets the range to the right. A negative number offsets the range to the left. The default value for both parameters is zero.

If you only assign a value to one of the parameters, Excel gives the other parameter a value of zero. For example, with a value of 5 for the `RowOffset` and no `ColumnOffset` parameter value, the property returns the range that is five rows from the current range selection.

If you specify a value outside the valid number of rows and columns in a worksheet (for example, if you specify Offset(-1, -1) and the current cell is A1, VBA returns an error.

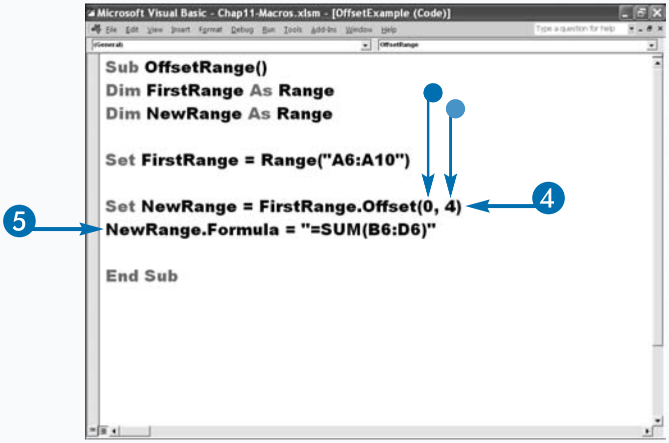
Using the Offset Property

1. Name your procedure.
2. Declare the Range object variables that you will use to store your ranges.
3. Store your range to an object variable.


Microsoft Visual Basic - Chap11-Macros.xlsm - [OffsetExample (Code)]
(General)
OffsetRange
1
2
3

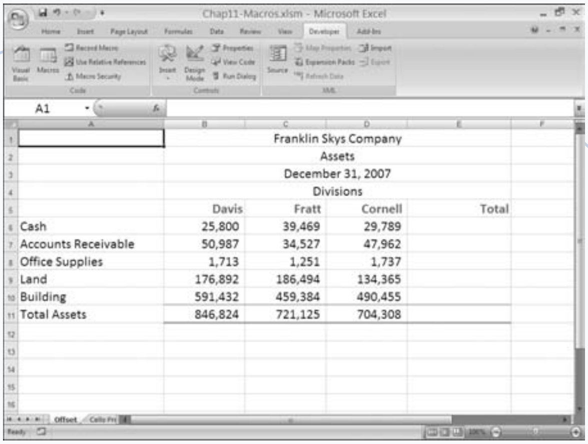
```
Sub OffsetRange()


Set FirstRange = Range("A6:A10")
```

4. Use the Offset property to define the range.
   - The same row.
   - Four columns to the right.
5. Place a formula in the offset range.
6. Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap11-Macros.xlsm - [OffsetExample (Code)]
(General)
OffsetRange
4
5

```
Sub OffsetRange()
Dim FirstRange As Range
Dim NewRange As Range

Set FirstRange = Range("A6:A10")

Set NewRange = FirstRange.Offset(0, 4)
NewRange.Formula = "=SUM(B6:D6)"

End Sub
```

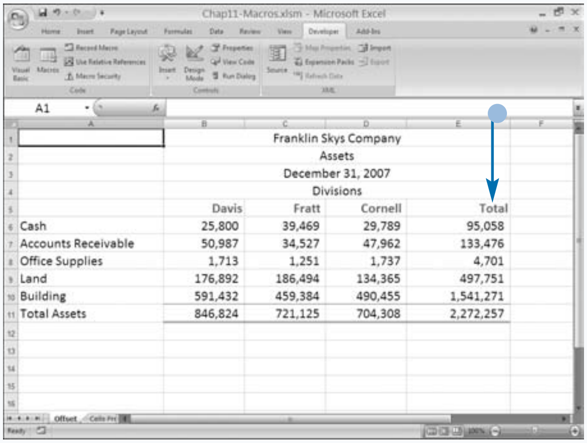
The worksheet before you run the macro.



	A	B	C	D	E
1			Franklin Skys Company		
2			Assets		
3			December 31, 2007		
4			Divisions		
5		Davis	Fratt	Cornell	Total
6	Cash	25,800	39,469	29,789	
7	Accounts Receivable	50,987	34,527	47,962	
8	Office Supplies	1,713	1,251	1,737	
9	Land	176,892	186,494	134,365	
10	Building	591,432	459,384	490,455	
11	Total Assets	846,824	721,125	704,308	

The worksheet after you run the macro.

- The macro uses the offset property to create the values under the Total column.



	A	B	C	D	E
1			Franklin Skys Company		
2			Assets		
3			December 31, 2007		
4			Divisions		
5		Davis	Fratt	Cornell	Total
6	Cash	25,800	39,469	29,789	95,058
7	Accounts Receivable	50,987	34,527	47,962	133,476
8	Office Supplies	1,713	1,251	1,737	4,701
9	Land	176,892	186,494	134,365	497,751
10	Building	591,432	459,384	490,455	1,541,271
11	Total Assets	846,824	721,125	704,308	2,272,257

Extra

You can use the `Offset` property in a `For Next` loop to cycle through a range of cells.

Example:

```
Dim Count As Integer
Count = 1
For Count = 1 To 4
     ActiveCell.Offset(Count -1, 0) = "Region" & Count
Next Count
```

The initial value of `Count` is 1. `Count -1` is equal to zero. The code offsets from the `ActiveCell`. As a result, the code starts executing from the active cell, `ActiveCell.Offset(Count -1, 0)`, which resolves to `ActiveCell.Offset(0,0)`. With each loop, the value of `Count` increases by 1, and so VBA stays in the same column, but moves down one row. See Chapter 6 to learn more about using a `For Next` loop and to see this code in action.

Delete a Range of Cells

To remove a range of cells from a worksheet, use the `Delete` method. Excel completely removes the cells and adjusts the remaining values in the worksheet to fill the gap left by the deletion. For example, if you remove column B, Excel shifts the values in column C to the left to become the new column B values, and all remaining column values shift to the left as well. Conversely, if you delete a row, Excel shifts all values up one row. You can reference an entire column by using the syntax `Columns(ColumnNumber)`. You can reference an entire row by using the syntax `Rows(RowNumber)`. The following examples delete column 2 and row 3, respectively:

```
Columns(2).Delete
```

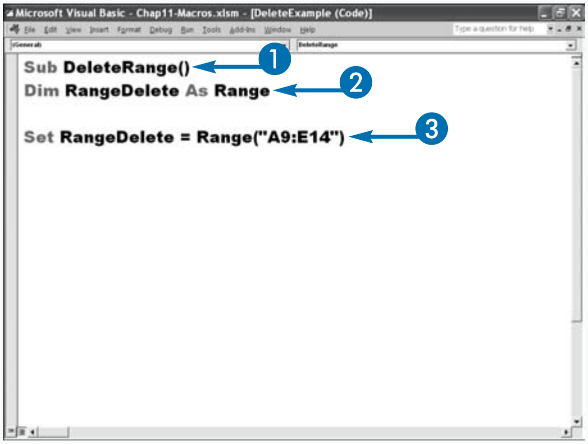
```
Rows(3).Delete
```

Excel easily determines how to shift the cells when you remove entire rows and columns, but if you remove a block of cells, you must specify how the remaining values fill by using the `Shift` parameter with the `Delete` method. When you use the `Shift` parameter, you assign it one of the `XlDeleteShiftDirection` constant values. The value, `xlShiftToLeft`, tells Excel to shift values to the left to fill the gap created by the deletion. The `xlShiftUp` constant value tells Excel to shift values up to fill the gap. For best results, specify how to shift the cells.

Excel ignores the `Shift` parameter value if it is not a valid shift direction for the deleted range. For example, the code `Column(2).Delete Shift:=xlShiftUp` deletes a column, but Excel shifts the cells to the left because there are no cells to shift up.

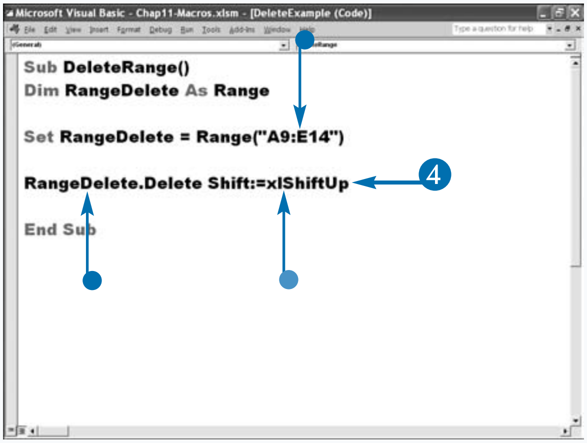
Delete a Range of Cells

1. Name your procedure.
2. Declare a Range object variable.
3. Store your range to an object variable.


Microsoft Visual Basic - Chap11-Macros.xlsm - [DeleteExample (Code)]
1
2
3

```
Sub DeleteRange()
Dim RangeDelete As Range

Set RangeDelete = Range("A9:E14")
```

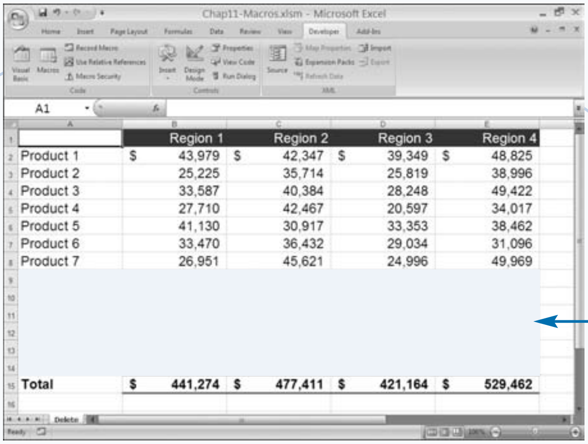
4. Delete your range.
   - The range you want to delete.
   - The instruction to shift up.
5. Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap11-Macros.xlsm - [DeleteExample (Code)]
4

```
Sub DeleteRange()
Dim RangeDelete As Range

Set RangeDelete = Range("A9:E14")

RangeDelete.Delete Shift:=xlShiftUp

End Sub
```

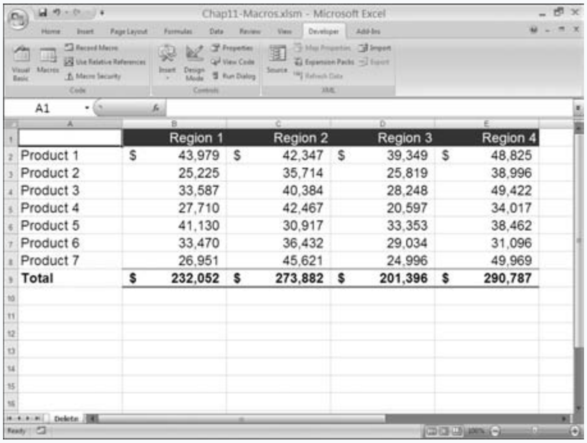
The worksheet before you run your macro.

- The rows that the macro will delete.



	Region 1	Region 2	Region 3	Region 4
Product 1	$ 43,979	$ 42,347	$ 39,349	$ 48,825
Product 2	25,225	35,714	25,819	38,996
Product 3	33,587	40,384	28,248	49,422
Product 4	27,710	42,467	20,597	34,017
Product 5	41,130	30,917	33,353	38,462
Product 6	33,470	36,432	29,034	31,096
Product 7	26,951	45,621	24,996	49,969
Total	**$ 441,274**	**$ 477,411**	**$ 421,164**	**$ 529,462**

The worksheet after you run your macro.



	Region 1	Region 2	Region 3	Region 4
Product 1	$ 43,979	$ 42,347	$ 39,349	$ 48,825
Product 2	25,225	35,714	25,819	38,996
Product 3	33,587	40,384	28,248	49,422
Product 4	27,710	42,467	20,597	34,017
Product 5	41,130	30,917	33,353	38,462
Product 6	33,470	36,432	29,034	31,096
Product 7	26,951	45,621	24,996	49,969
Total	**$ 232,052**	**$ 273,882**	**$ 201,396**	**$ 290,787**

Extra

You may not be able to remove cells from or add cells to a protected worksheet. You can use the `AllowEdit` property to determine if you can modify a range. The `AllowEdit` property returns a Boolean value of `True` if you can modify the specified range. In the example code, the `AllowEdit` property checks a range to make sure you can modify the range before it calls the `Delete` method.

Example:

```
If RangeDelete.AllowEdit Then
    RangeDelete.Delete Shift:=xlShiftUp
End If
```

The code checks the `AllowEdit` property for the specified Range object. The `If Then` statement ensures that the code attempts to delete the specified range of cells only if you can modify the range. Otherwise, Excel ignores the `Delete` statement.

To protect worksheets, use the `Protect` method. See Chapter 10 for more information on using the `Protect` method to protect a worksheet.

Hide a Range of Cells

You can use the `Hidden` property with the `Range` object to hide a range of cells. You commonly hide portions of a worksheet so that you can focus in on other data. For example, a worksheet may contain monthly data and quarterly summaries. You can hide the monthly data so you can focus on the quarterly summaries.

With the `Hidden` property, the range of cells you hide must consist of an entire row or column. You hide a range by assigning a value of `True` to the `Hidden` property for the specified range. You make the range visible again by assigning the value `False` to the Hidden property. When you hide a range of cells, Excel sets either the width of the columns or the height of the rows to zero, as in the following example:

```
Rows(2).Hidden
```

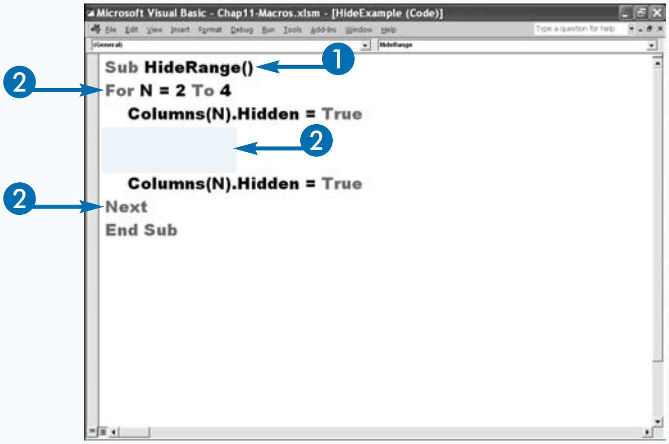
You can use the `Hidden` property either to determine if a range is hidden. You can find out if a range of cells is hidden by checking the `Hidden` property. For example, you can check to see if column A is hidden by typing `HiddenRange = Columns(1).Hidden`. If you declare the `HiddenRange` variable as a Boolean value, the variable receives a value of `True` if the specified range is hidden; otherwise, it receives a value of `False`. If you do not declare the variable as Boolean, Excel assigns a numeric value of –1 if the range is hidden and zero if the range is visible.

Hide a Range of Cells

① Name your procedure.

② Create `For Next` loops.

In this example, the `For Next` loop enables you to hide multiple columns — columns 2 to 4 in the first loop and columns 6 to 8 in the second loop.



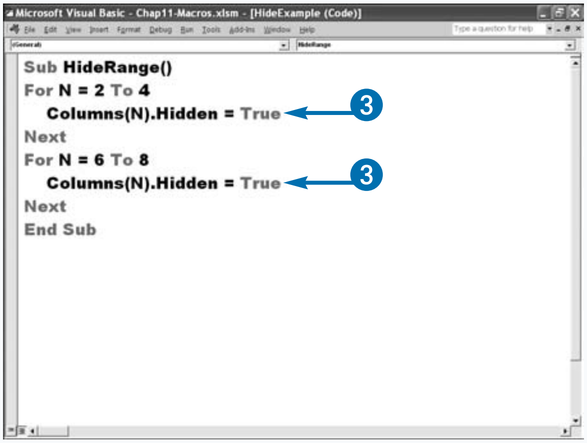
Microsoft Visual Basic - Chap11-Macros.xlsm - [HideExample (Code)]
(General)
HideRange
1
2
2
2

```
Sub HideRange()
For N = 2 To 4
   Columns(N).Hidden = True

   Columns(N).Hidden = True
Next
End Sub
```

③ Set the `Hidden` property to `True` to hide the columns.

You can set the `Hidden` property to `False` to unhide the columns.

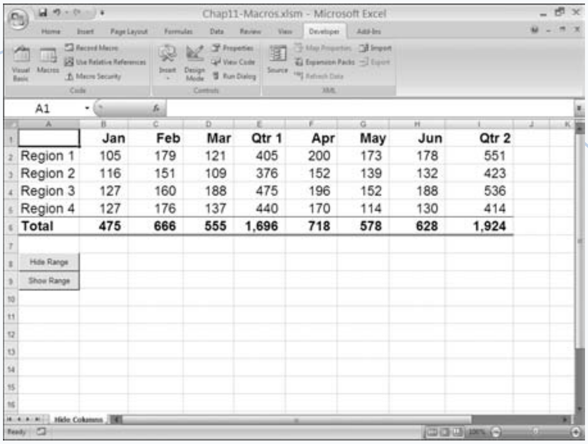
④ Press Alt+F11 to switch from the VBE to Excel, and run the macro.



Microsoft Visual Basic - Chap11-Macros.xlsm - [HideExample (Code)]
(General)
HideRange
3
3

```
Sub HideRange()
For N = 2 To 4
   Columns(N).Hidden = True
Next
For N = 6 To 8
   Columns(N).Hidden = True
Next
End Sub
```

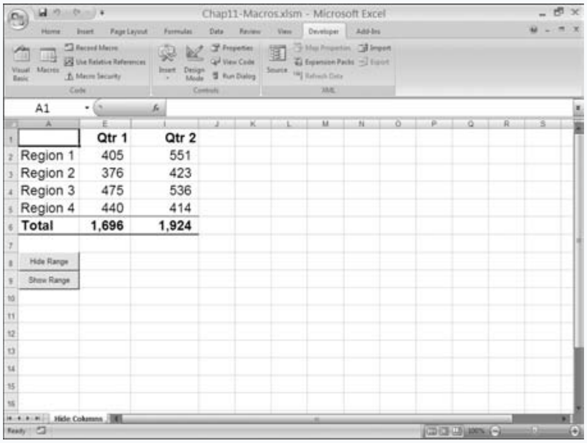
The worksheet before you run the macro.


Chap11-Macros.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
A1
Hide Range
Show Range
Hide Columns
Ready

	Jan	Feb	Mar	Qtr 1	Apr	May	Jun	Qtr 2
Region 1	105	179	121	405	200	173	178	551
Region 2	116	151	109	376	152	139	132	423
Region 3	127	160	188	475	196	152	188	536
Region 4	127	176	137	440	170	114	130	414
Total	**475**	**666**	**555**	**1,696**	**718**	**578**	**628**	**1,924**

The worksheet after you run the macro.

The macro hides the columns you specified.


Chap11-Macros.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
A1
Hide Range
Show Range
Hide Columns
Ready

	Qtr 1	Qtr 2
Region 1	405	551
Region 2	376	423
Region 3	475	536
Region 4	440	414
Total	**1,696**	**1,924**

Apply It

When you hide a row or column in Excel, you can still access the values contained in the cells by referencing them in functions and macros. Excel indicates the existence of hidden rows and columns by skipping over the hidden rows and columns in the row and column headings. For example, if you hide columns C and D, you see the column labels for columns A, B, E, F, and so on.

To unhide rows or columns in a worksheet, set the Hidden property to `False`. The following code unhides all columns in a worksheet.

Example:

```
Columns.Hidden = False
```

This statement is useful for ensuring that all cells in a worksheet are visible. You can use the `Rows` property to unhide all hidden rows.

Example:

```
Rows.Hidden = False
```

Create a Range Name

In Excel, you can name ranges. Range names are easier to remember than cell addresses. When you name a range, you can refer to the range using the range name when creating formulas or performing other tasks. When you move a range to a new location, Excel automatically updates any formulas that refer to it.

When you use a named range in a procedure, you do not need to know the location of the cells that contain the desired values. For example, if cell B3 contains the sales tax rate, assign the name *Tax_Rate* to the cell so you can reference the cell by name when you want to use it.

In VBA, you use the `Name` property to assign a name to a range of cells, as follows:

```
Columns(3).Name = "May_Sales"
```

This example assigns the name May_Sales to Column C in the active worksheet. To view the assigned name in Excel, you select the range, and the name appears in the Name box on the Formula bar.

Whenever you need to reference a range in your procedure, you can use its range name. You can reference range names created by your procedure and range names created manually in Excel. You can modify and delete the range names you define in a VBA procedure in Excel.

To delete a range name using a procedure, use the `Delete` method. The following example deletes the range name *May_Sales*:

```
ActiveWorkbook.Names("May_Sales").Delete
```

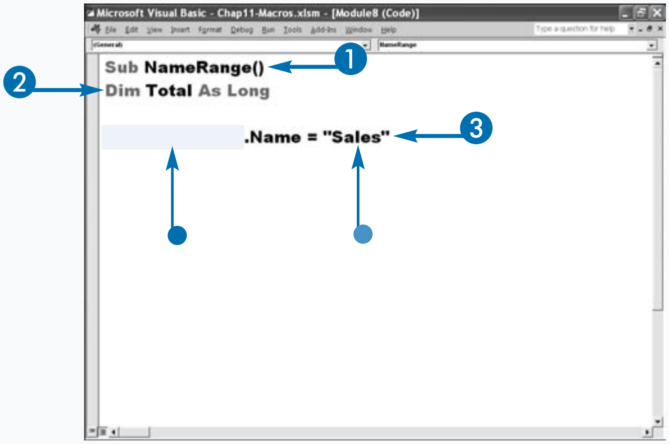
Create a Range Name

① Name your procedure.

② Declare your variable.

③ Assign a name to a range.

- The range to which you want to assign a name.
- The name that you want to assign the range.


Microsoft Visual Basic - Chap11-Macros.xlsm - [Module8 (Code)]
(General)
NameRange
1
2
3

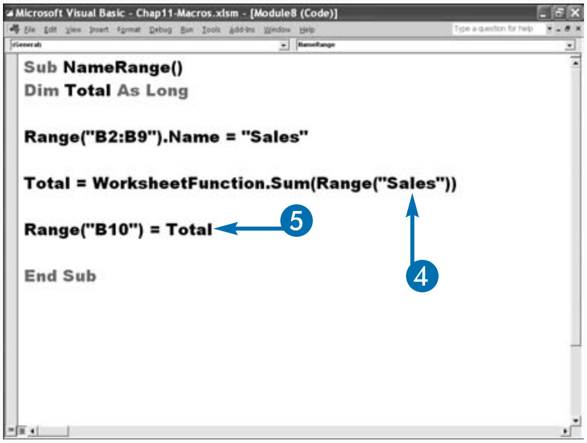
```
Sub NameRange()
Dim Total As Long

                .Name = "Sales"
```

④ Use the range name.

In this example, the worksheet function Sum totals the range.

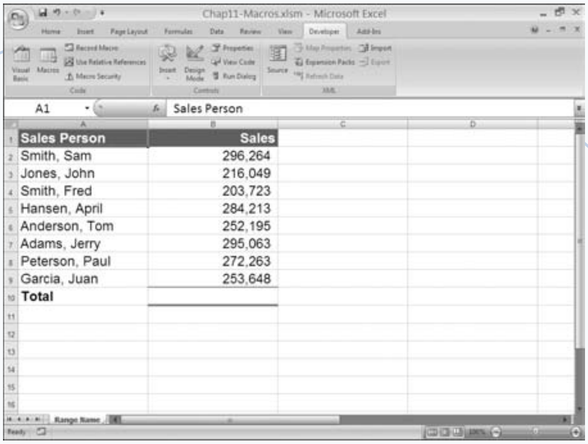
⑤ Assign the result of the worksheet function to a cell.

⑥ Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap11-Macros.xlsm - [Module8 (Code)]
(General)
NameRange
5
4

```
Sub NameRange()
Dim Total As Long

Range("B2:B9").Name = "Sales"

Total = WorksheetFunction.Sum(Range("Sales"))

Range("B10") = Total

End Sub
```

The worksheet before you run your macro.

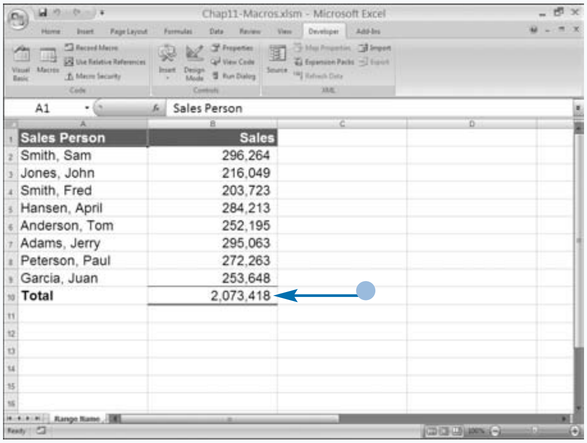

Chap11-Macros.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Range Name
Ready

A1 Sales Person

Sales Person	Sales
Smith, Sam	296,264
Jones, John	216,049
Smith, Fred	203,723
Hansen, April	284,213
Anderson, Tom	252,195
Adams, Jerry	295,063
Peterson, Paul	272,263
Garcia, Juan	253,648
Total	

The worksheet after you run your macro.

- The macro uses the named range to sum a range of cells.


Chap11-Macros.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Range Name
Ready

A1 Sales Person

Sales Person	Sales
Smith, Sam	296,264
Jones, John	216,049
Smith, Fred	203,723
Hansen, April	284,213
Anderson, Tom	252,195
Adams, Jerry	295,063
Peterson, Paul	272,263
Garcia, Juan	253,648
Total	2,073,418

Extra

To create a named range in Excel, select the range, click the Formulas tab on the Ribbon, and then click Define Name in the Defined Names group. The New Name dialog box appears. Type a name in the Name field, and then click OK.

Click Name Manger on the Formulas tab to open the Name Manger. The Name Manager contains a list of all named ranges. To see which cells a named range includes, select the range name in the Name Manager; the corresponding range displays in the Refers To field. If you want to delete a named range, highlight the range name and then click Delete. If you delete a named range, any macros that reference the named range will not work.

You can also use the Name Manager to modify a named range. In the Name Manager, click the Edit button. The Edit Name dialog box appears. Use the Refers To field to define the range of cells to which the range name refers.

Resize a Range

You can use the `Resize` property to change the size of a range. When you resize a range, you change the number of rows and columns. You can specify either more or fewer rows or columns.

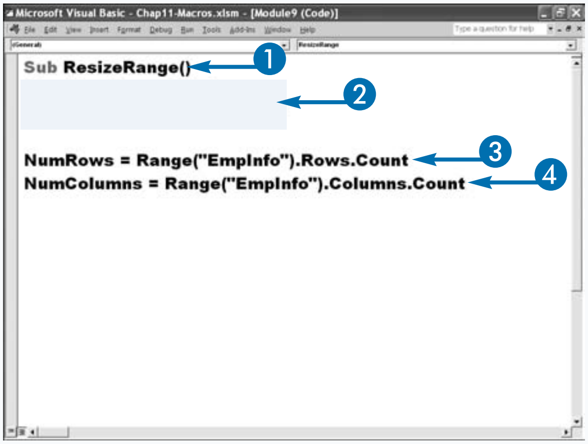
The `Resize` property has two optional parameters; however, you should set at least one of the two parameters. If you do not use either parameter, Excel returns the original range. The first parameter, `RowSize`, sets the number of rows in the new range. The second parameter, `ColumnSize`, sets the number of columns in the new range.

When you resize the range, the upper-left corner of the original range remains the same. For example, if the original range is B1 to C4 and you resize the range to contain only two rows and two columns, then B1 remains the upper-left cell value. VBA adjusts the range based on that cell, creating a new range of cells from B1 to C2.

You may need to know how many rows and columns currently exist in a range before you can determine how to resize it. If you are working with a range that is defined elsewhere, such as a named range, use the `Count` property to determine the number of rows and columns in the range, as shown in the following code: `NumberOfRows = Range("Named_Range").Rows.Count`. The `Count` property counts the number of rows in Named_Range and assigns that result to the `NumberOfRows` variable. You use the same syntax with the `Columns` property to count the number of columns in a range. Once you know the size of the range, you can use the `Resize` property to modify the number of rows and columns.

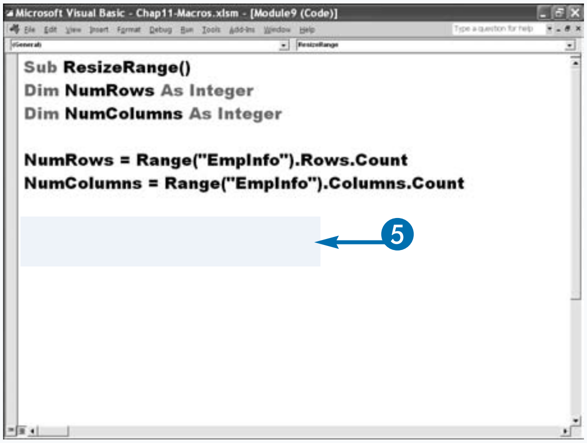
Resize a Range

1. Name your procedure.
2. Declare your variables.
3. Count the number of rows in a range and assign the result to a variable.
4. Count the number of columns in a range and assign the result to a variable.


Microsoft Visual Basic - Chap11-Macros.xlsm - [Module9 (Code)]
(General)
ResizeRange
1
2
3
4

```
Sub ResizeRange()


NumRows = Range("EmpInfo").Rows.Count
NumColumns = Range("EmpInfo").Columns.Count
```

5. Add 3 to the values stored in your variables.

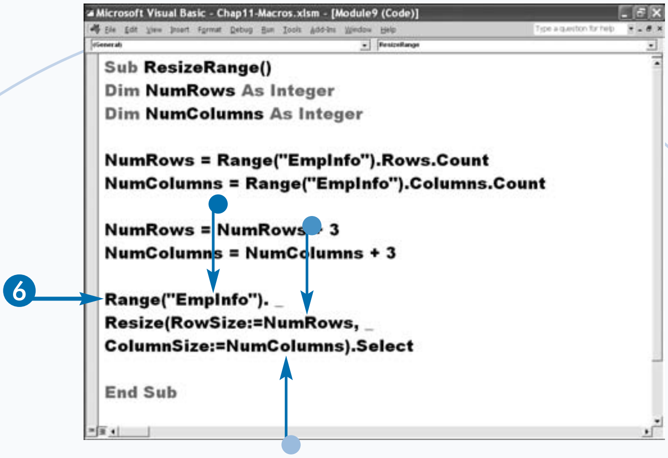

Microsoft Visual Basic - Chap11-Macros.xlsm - [Module9 (Code)]
(General)
ResizeRange
5

```
Sub ResizeRange()
Dim NumRows As Integer
Dim NumColumns As Integer

NumRows = Range("EmpInfo").Rows.Count
NumColumns = Range("EmpInfo").Columns.Count
```

6. Resize your range.

- The range you want to resize.
- Sets the number of rows to the value in your NumRow variable.
- Sets the number of columns to the value in your NumCol variable.

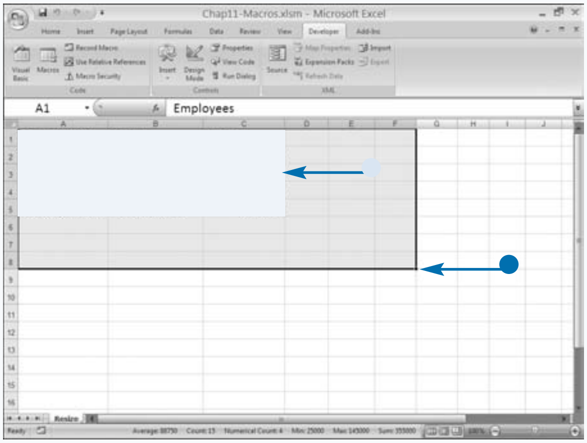
7. Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap11-Macros.xlsm - [Module9 (Code)]
(General)
ResizeRange
6

```
Sub ResizeRange()
Dim NumRows As Integer
Dim NumColumns As Integer

NumRows = Range("EmpInfo").Rows.Count
NumColumns = Range("EmpInfo").Columns.Count

NumRows = NumRows + 3
NumColumns = NumColumns + 3

Range("EmpInfo"). _
Resize(RowSize:=NumRows, _
ColumnSize:=NumColumns).Select

End Sub
```

The macro resizes the range.

- The original size of the range.
- The current size of the range.


Chap11-Macros.xlsm - Microsoft Excel
A1
Employees
Resize

Extra

Besides determining the number of rows and columns in a range, you may need to know the exact row or column in which the range begins. To do this, use either the `Row` property or the `Column` property. The following code determines the number of the first row in a range:

Example:

```
FirstRowNum = Range("EmpInfo").Row
```

This code assigns the integer value representing the first row in the specified range to the `FirstRowNum` variable. You can also determine the first column in the range by using the `Column` property, as shown in this code:

Example:

```
FirstColNum = Range("EmpInfo").Column
```

Insert a Range

You can use the `Insert` method to insert a range of cells into a worksheet. When you insert a range of cells, VBA adjusts the values in the existing cells by moving them either down or to the right so that it can insert the new cells into the specified location. For example, if you insert a new row of cells in row 3, VBA shifts the existing values in row 3 down to row 4 and shifts all of the values in cells below row 3 down as well. If you add a new column, Excel shifts all existing values to the right. The following examples insert a column and a row, respectively:

```
Columns(2).Insert

Rows(3).Insert
```

How the cell values in the worksheet should shift when you add an entire row or column is obvious. With a smaller block of cells, you must use the `InsertShift` parameter to tell VBA how the cells shift. To make sure the cells shift correctly, assign the shift parameter one of the `XlInsertShiftDirection` constant values. You can use the `xlShiftToRight` constant value to shift the cell values to the right. You can use the `xlShiftDown` constant value to shift the cell values down. The following example shifts cells to the right:

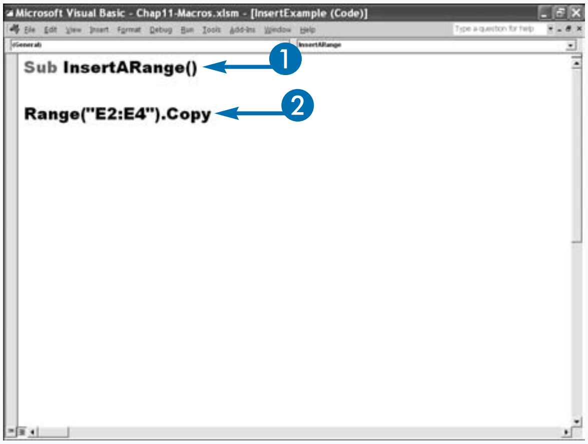
```
Range("B5:B7").Insert:=xlShiftToRight
```

You use the `Cut` and `Copy` methods to paste data to the Office Clipboard. You can insert data that is on the Office Clipboard into your worksheet by placing a `Cut` or `Copy` command before the `Insert` command in your procedure. See Chapter 12 to learn more about the `Cut` and `Copy` methods.

Insert a Range

① Name your procedure.

② Copy a range.

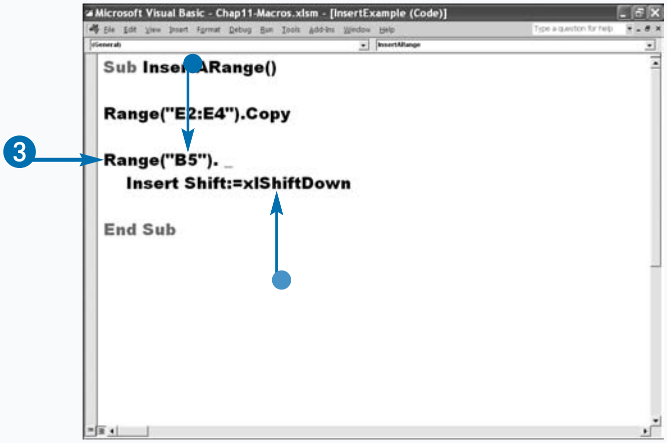

Microsoft Visual Basic - Chap11-Macros.xlsm - [InsertExample (Code)]
(General)
InsertARange
1
2

```
Sub InsertARange()

Range("E2:E4").Copy
```

③ Insert the range.

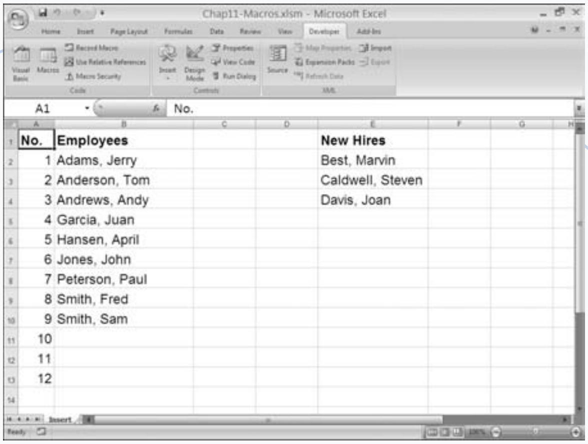
- The point at which to begin the insertion.
- The shift direction.

④ Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap11-Macros.xlsm - [InsertExample (Code)]
(General)
InsertARange
3

```
Sub InsertARange()

Range("E2:E4").Copy

Range("B5"). _
   Insert Shift:=xlShiftDown

End Sub
```

The worksheet before you run the macro.

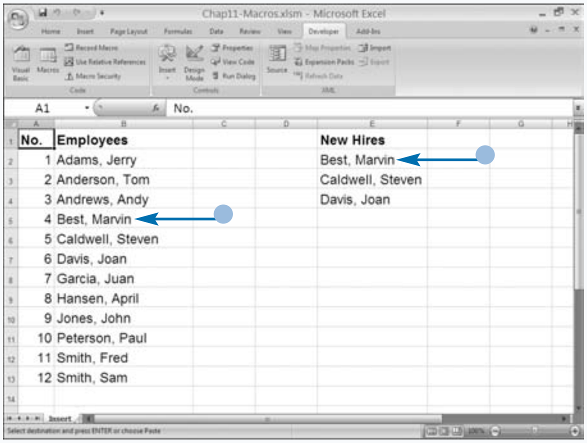


Chap11-Macros.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
A1
No.
Insert
Ready

	A	B	C	D	E
1	No.	Employees			New Hires
2	1	Adams, Jerry			Best, Marvin
3	2	Anderson, Tom			Caldwell, Steven
4	3	Andrews, Andy			Davis, Joan
5	4	Garcia, Juan			
6	5	Hansen, April			
7	6	Jones, John			
8	7	Peterson, Paul			
9	8	Smith, Fred			
10	9	Smith, Sam			
11	10				
12	11				
13	12				
14					

The worksheet after you run the macro.

- The macro places the copied data in the insert location.



Chap11-Macros.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
A1
No.
Insert
Select destination and press ENTER or choose Paste

	A	B	C	D	E
1	No.	Employees			New Hires
2	1	Adams, Jerry			Best, Marvin
3	2	Anderson, Tom			Caldwell, Steven
4	3	Andrews, Andy			Davis, Joan
5	4	Best, Marvin			
6	5	Caldwell, Steven			
7	6	Davis, Joan			
8	7	Garcia, Juan			
9	8	Hansen, April			
10	9	Jones, John			
11	10	Peterson, Paul			
12	11	Smith, Fred			
13	12	Smith, Sam			
14					

Extra

You can also use the `Insert` method to add a value to a cell. To insert a value in a cell, use the Insert method with the `Characters` object. You can insert a string of characters at the beginning of a cell or at any location in the cell. For example, to insert the string "New String" in cell B1 and replace the contents, type the following code:

Example:

```
Range("B1").Characters.Insert("New String")
```

To place the new string within the existing string of characters, indicate the location to place the new string and the number of characters to replace at that location. For example, in the string "Excel 2008 Worksheet," you can replace the "2008" with "2009" by using the `Insert` method. The following code illustrates how to make the replacement when the string is located in cell A1.

Example:

```
Range("A1").Characters(7,4).Insert("2009")
```

The `Characters` object has two parameters, `Start` and `Length`. The `Start` parameter indicates the number of the character at which to start the insert — in this case, character 7. The `Length` parameter indicates the number of characters to replace.

Set the Width of Columns in a Range

To set the width of a column, use the `ColumnWidth` property. By default, Excel assigns a width of 8.43 characters to each column. Excel bases this width size on the number of zeros it can place in the cell using the Normal style. One unit is equal to one character. In the following example Excel sets column 1 to 15 characters in the Normal style:

```
Columns(1).ColumnWidth = 15
```

You can also use the `ColumnWidth` property to determine the width of the columns in a range. If all columns in the range have the same width, the `ColumnWidth` property returns the number of characters that can display in each column using the Normal style. If the column widths in the selected range vary, the `ColumnWidth` property returns Null. The following example,

```
ColWidth = Columns(1).ColumnWidth
```

returns the width of column 1.

Every worksheet has a default width, commonly referred to as the standard width. You can use the `StandardWidth` property to set the columns in a worksheet to the standard width. The following example sets every column in a worksheet to the standard width:

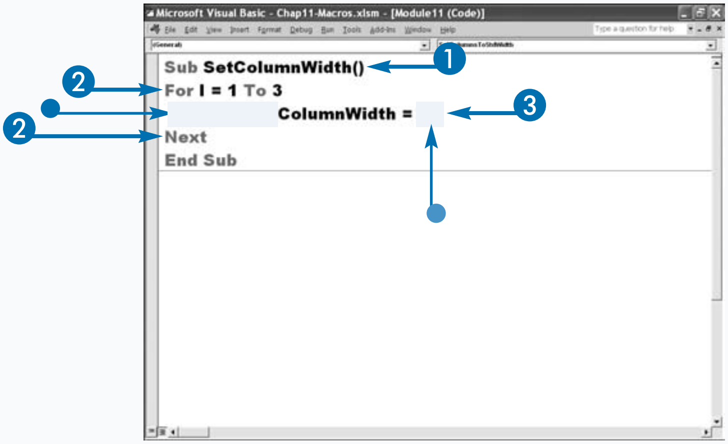
```
Columns.ColumnWidth = _
   ActiveSheet.StandardWidth
```

Set the Width of Columns in a Range

SET A COLUMN WIDTH

1. Name your procedure.
2. Create a `For Next` loop.
3. Create a `ColumnWidth` command.

- The column for which you want to set the column width.
- The amount to which you want to set the column width.



Microsoft Visual Basic - Chap11-Macros.xlsm - [Module11 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
1
2
3
2

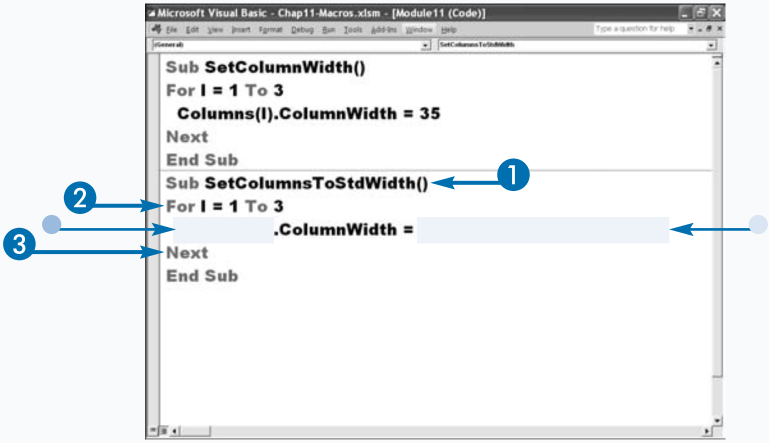
```
Sub SetColumnWidth()
For I = 1 To 3
              ColumnWidth =
Next
End Sub
```

SET COLUMNS TO A STANDARD WIDTH

1. Name your procedure.
2. Create a `For Next` loop.
3. Create a ColumnWidth command.

- The column for which you want to set the column width.
- The amount to which you want to set the column width.

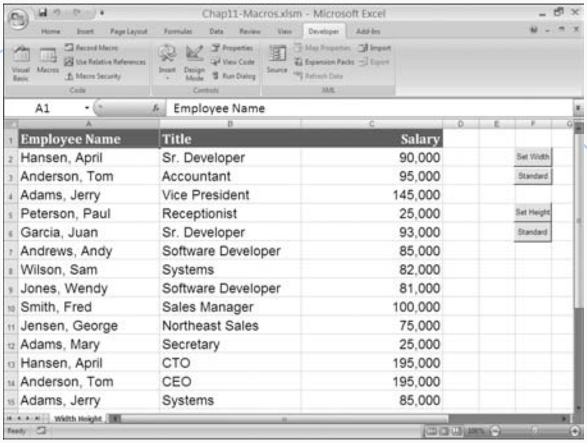
4. Press Alt+F11 to switch from the VBE to Excel, and run the macros.



Microsoft Visual Basic - Chap11-Macros.xlsm - [Module11 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
1
2
3

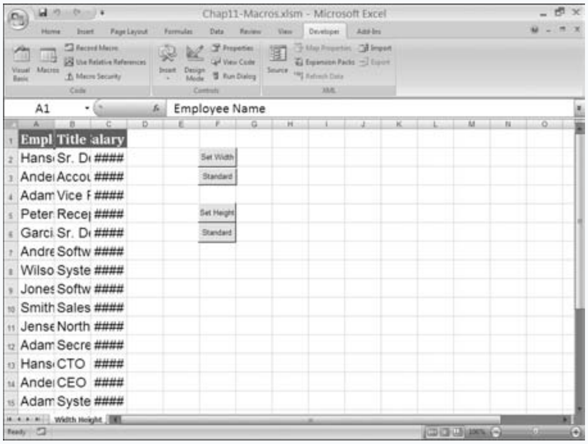
```
Sub SetColumnWidth()
For I = 1 To 3
  Columns(I).ColumnWidth = 35
Next
End Sub
Sub SetColumnsToStdWidth()
For I = 1 To 3
              .ColumnWidth =
Next
End Sub
```

When you run the `SetColumnWidth` macro, the macro sets columns 1, 2, and 3 to 35.


Chap11-Macros.xlsm - Microsoft Excel
A1
Employee Name
Set Width
Standard
Set Height
Standard
Width
Height

Employee Name	Title	Salary
Hansen, April	Sr. Developer	90,000
Anderson, Tom	Accountant	95,000
Adams, Jerry	Vice President	145,000
Peterson, Paul	Receptionist	25,000
Garcia, Juan	Sr. Developer	93,000
Andrews, Andy	Software Developer	85,000
Wilson, Sam	Systems	82,000
Jones, Wendy	Software Developer	81,000
Smith, Fred	Sales Manager	100,000
Jensen, George	Northeast Sales	75,000
Adams, Mary	Secretary	25,000
Hansen, April	CTO	195,000
Anderson, Tom	CEO	195,000
Adams, Jerry	Systems	85,000

When you run the `SetColumnstoStdWidth` macro, the macro sets columns 1, 2, and 3 to the standard width.


Chap11-Macros.xlsm - Microsoft Excel
A1
Employee Name
Set Width
Standard
Set Height
Standard
Width
Height

Empl	Title	alary
Hans	Sr. De	####
Ande	Accou	####
Adam	Vice P	####
Peter	Recep	####
Garci	Sr. De	####
Andre	Softw	####
Wilso	Syste	####
Jones	Softw	####
Smith	Sales	####
Jense	North	####
Adam	Secre	####
Hans	CTO	####
Ande	CEO	####
Adam	Syste	####

Extra

You can also use the `Width` property to obtain the width of a particular column. The `Width` property returns the measurement of the column width in points, unlike the `ColumnWidth` property, which returns characters. You typically use points to reference font sizes (1 point is equivalent to 1/72 of an inch).

The `Width` property is Read-Only, meaning that you can only use it to return the width of a column. To return the `Width` property of a column, assign the value to a variable, as shown in the following code.

Example:

```
ColWidth = Column(4).Width
```

The `Width` property is useful when you want to compare a column width to a row height, because Excel stores row heights in points.

Set the Height of Rows in a Range

To modify the height of rows in a range, you can use the `RowHeight` property. By default, Excel assigns a height of 12.75 points to each row. Excel measures font sizes in points, with each point being approximately 1/72 of an inch. Because the default font size in Excel is 10 points, the default row size of 12.75 points is usually adequate for displaying text in cells. For a larger font size or text that wraps in a cell, you can specify a larger row size by using the `RowHeight` property.

You can set the height of the row by assigning a numeric value to the `RowHeight` property. For example, to change the height of row 2 to 25 points, use the code `Rows(2).RowHeight=25`. When you use the `Rows` property without referencing a `Range` object, Excel automatically uses the active sheet. If the row height you specify is not high enough to display the entire font, the text appears cut off in the row when you view it in Excel.

You can also use the `RowHeight` property to obtain the height of the rows in a range. If all rows in the range have the same height, the height is returned as the number of points. If the rows in the selected range do not have the same height, the `RowHeight` property returns Null. The following example demonstrates how to use the `RowHeight` property to obtain the height of a row:

```
RowHeight = Rows(1).RowHeight
```

Every worksheet has a default height, commonly referred to as the standard height. You can use the `StandardHeight` property to set the standard height for a worksheet and to set rows in a worksheet to the standard height. The following example sets every row in a worksheet to the standard height:

```
Rows.RowHeight = ActiveSheet.StandardHeight
```

Set the Height of Rows in a Range

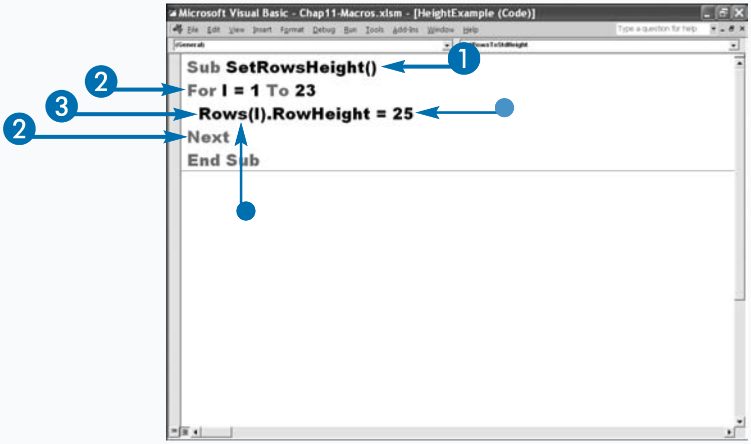
SET THE ROW HEIGHT

① Name your procedure.

② Create a `For Next` loop.

③ Create a `RowHeight` command.

- The rows for which you want to set the height.
- The amount to which you want to set the row height.


Microsoft Visual Basic - Chap11-Macros.xlsm - [HeightExample (Code)]
(General)
SetRowsToStdHeight
1
2
3
2

```
Sub SetRowsHeight()
For I = 1 To 23
  Rows(I).RowHeight = 25
Next
End Sub
```

SET ROWS TO THE STANDARD HEIGHT

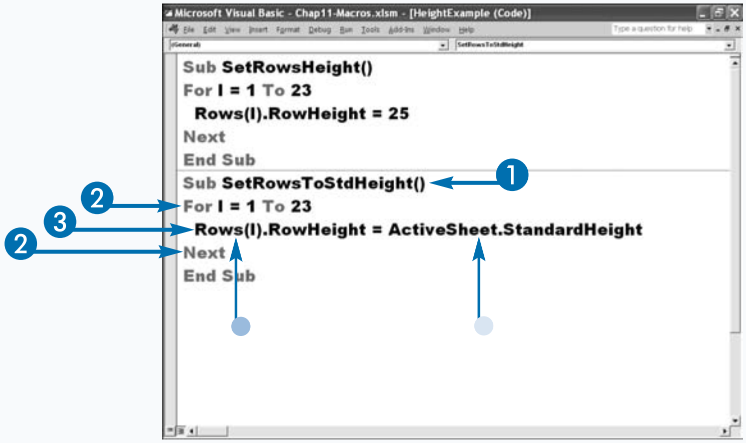
① Name your procedure.

② Create a `For Next` loop.

③ Create a RowHeight command.

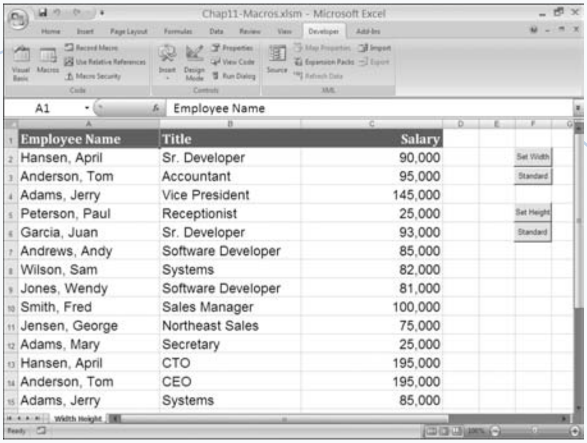
- The row for which you want to set the height.
- The amount to which you want to set the row height.

④ Press Alt+F11 to switch from the VBE to Excel, and run the macros.


Microsoft Visual Basic - Chap11-Macros.xlsm - [HeightExample (Code)]
(General)
SetRowsToStdHeight
1
2
3
2

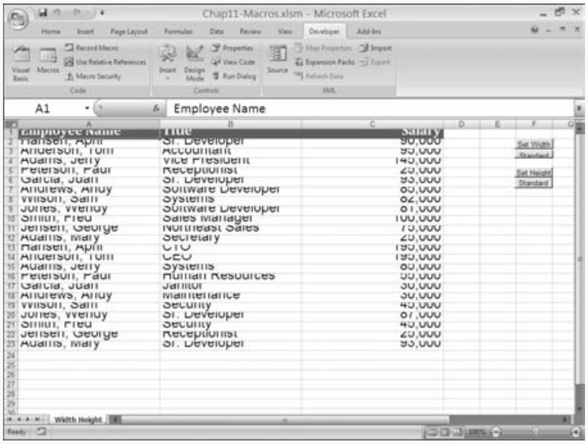
```
Sub SetRowsHeight()
For I = 1 To 23
  Rows(I).RowHeight = 25
Next
End Sub
Sub SetRowsToStdHeight()
For I = 1 To 23
  Rows(I).RowHeight = ActiveSheet.StandardHeight
Next
End Sub
```

When you run the `SetRowsHeight` macro, the macro sets rows 1 to 23 to 25.


Chap11-Macros.xlsm - Microsoft Excel
A1
Employee Name
Set Width
Standard
Set Height
Standard
Width Height
Ready

Employee Name	Title	Salary
Hansen, April	Sr. Developer	90,000
Anderson, Tom	Accountant	95,000
Adams, Jerry	Vice President	145,000
Peterson, Paul	Receptionist	25,000
Garcia, Juan	Sr. Developer	93,000
Andrews, Andy	Software Developer	85,000
Wilson, Sam	Systems	82,000
Jones, Wendy	Software Developer	81,000
Smith, Fred	Sales Manager	100,000
Jensen, George	Northeast Sales	75,000
Adams, Mary	Secretary	25,000
Hansen, April	CTO	195,000
Anderson, Tom	CEO	195,000
Adams, Jerry	Systems	85,000

When you run the `SetRowstoStdHeight` macro, the macro sets rows 1 to 23 to the standard height.


Chap11-Macros.xlsm - Microsoft Excel
A1
Employee Name
Width Height
Ready

Apply It

You can also use the `UseStandardHeight` property to set a row to the standard height. The following example sets row 1 of the active sheet to the standard height.

Example:

```
ActiveSheet.Rows(1).UseStandardHeight = True
```

You can use the `Height` property to determine the total height of a range of cells. Excel returns the height of the range in points. The `Height` property is Read-Only. You can obtain the range height by assigning the height value to a variable, as shown in this code.

TYPE THIS:

```
HeightofRange = Range("A1:A10").Height
```

RESULT:

The code assigns the total height of the rows specified by the Range object to the `HeightofRange` variable.

Convert a Column of Text into Multiple Columns

When you need to break a column of text into multiple columns, you can use the `TextToColumns` method. For example, if a list contains both first and last names in one column, you can use `TextToColumns` to break that list into two columns — one for the first name and one for the last name.

You use the `TextToColumns` method with the `Range` object. The `Range` object should contain the columns that you want to parse into multiple columns. The `TextToColumns` method provides several optional parameters you can use to specify how to separate the text.

You use the `Destination` parameter to specify the range into which VBA should place the results. For the `DataType` parameter, you specify a constant value of `xlDelimited` to break the text based on a delimiter value. You use `xlFixedWidth` if the text is a fixed width.

You use one of the `XlTextQualifier` constants, `xlTextQualifierDoubleQuote`, `xlTextQualifierNone`, or `xlTextQualifierSingleQuote`, to indicate the text qualifier character.

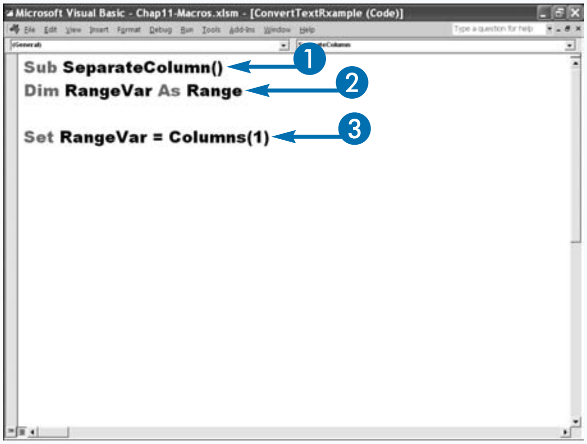
A delimiter is a character, such as a comma or space, which indicates a separation between strings. Specify a value of `True` for the `ConsecutiveDelimiter` parameter to have consecutive delimiters treated as one. For the `Tab`, `Semicolon`, `Comma`, `Space`, and `Other` parameters, specify a value of `True` for each delimiter that is used in the selected range. If you specify `Other` as the delimiter, set value for the `OtherChar` parameter to the delimiter character.

The `FileInfo` parameter contains information for parsing individual columns in the range, with the first element being the column number, and the second element being one of the `xlColumnDataType` constants.

Specify the character used to separate decimals with the `DecimalSeparator` parameter, and the character used to thousands with the `ThousandsSeparator` parameter value.

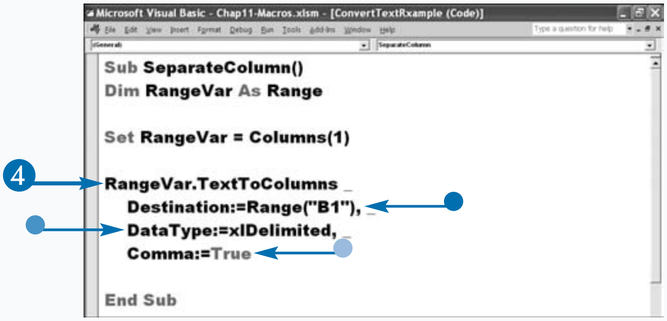
Convert a Column of Text into Multiple Columns

1. Name your procedure.
2. Declare a `Range` object variable.
3. Store column 1 to the `Range` object variable.


Microsoft Visual Basic - Chap11-Macros.xlsm - [ConvertTextRxample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Type a question for help
(General)
SeparateColumn
1
2
3

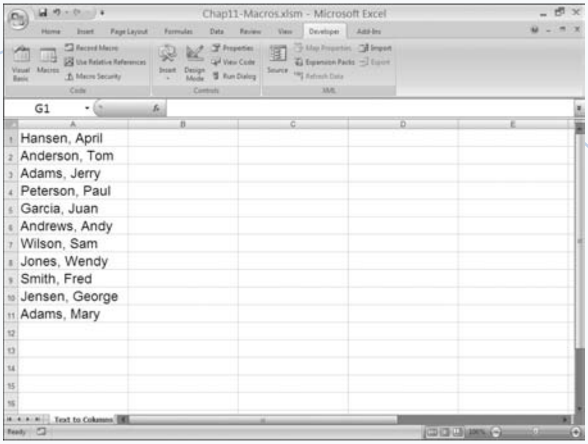
```
Sub SeparateColumn()
Dim RangeVar As Range

Set RangeVar = Columns(1)
```

4. Create your `TextToColumns` command.
   - Where you want to place the separated text.
   - The type of data.
   - The delimiter.
5. Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap11-Macros.xlsm - [ConvertTextRxample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Type a question for help
(General)
SeparateColumn
4

```
Sub SeparateColumn()
Dim RangeVar As Range

Set RangeVar = Columns(1)

RangeVar.TextToColumns _
   Destination:=Range("B1"), _
   DataType:=xlDelimited, _
   Comma:=True

End Sub
```

The worksheet before you run your macro.


Chap11-Macros.xlsm - Microsoft Excel
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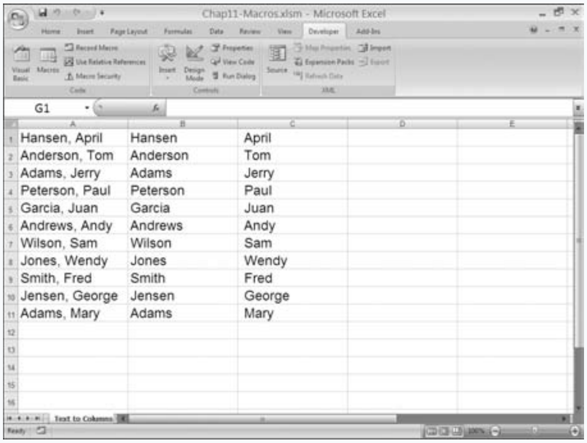
Add-Ins
G1
Text to Columns
Ready

	A	B	C	D	E
1	Hansen, April				
2	Anderson, Tom				
3	Adams, Jerry				
4	Peterson, Paul				
5	Garcia, Juan				
6	Andrews, Andy				
7	Wilson, Sam				
8	Jones, Wendy				
9	Smith, Fred				
10	Jensen, George				
11	Adams, Mary				
12					
13					
14					
15					
16					

The worksheet after you run your macro.

The macro separates one column of data into two columns of data.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G1
Text to Columns
Ready

	A	B	C	D	E
1	Hansen, April	Hansen	April		
2	Anderson, Tom	Anderson	Tom		
3	Adams, Jerry	Adams	Jerry		
4	Peterson, Paul	Peterson	Paul		
5	Garcia, Juan	Garcia	Juan		
6	Andrews, Andy	Andrews	Andy		
7	Wilson, Sam	Wilson	Sam		
8	Jones, Wendy	Jones	Wendy		
9	Smith, Fred	Smith	Fred		
10	Jensen, George	Jensen	George		
11	Adams, Mary	Adams	Mary		
12					
13					
14					
15					
16					

Extra

You can use the `Parse` method to separate data values in one column into multiple columns. This method works well for string data that is the same length, such as phone numbers. When using the `Parse` method, you specify how the strings in each cell should break, and VBA applies that format to each cell.

There are two optional parameters for the `Parse` method. The first parameter, `ParseLine`, is a string containing left and right brackets, indicating where the cells should split. For example, [xxxx][xxxx] breaks each string so that the first four characters are placed in the first column and the second four characters are placed in the second column. Any characters outside those eight characters are ignored. For example, for the string `"alphabetical"`, Excel would place the first four characters (alph) in the first column and the second four characters (abet) in the second column. Excel would ignore the remaining characters in the string. The second parameter, `Destination`, specifies the range where the Parse method places the data. If the range has more than one cell, Excel uses the upper-left corner of the range as the first cell.

Find the Intersection of Two Ranges

You can use the `Intersect` method to determine where multiple ranges intersect on a worksheet. A multiple-area range contains more than one block of cells that may or may not be connected. Use the Intersect method to create a Range object containing the cells that are common between two ranges. For example, for the ranges A1 to C5 and C1 to E5, the `Intersect` method returns the range C1:C5 because those cells are common to both ranges. If the specified ranges have no cells in common, the `Intersect` method returns an empty range.

With the `Intersect` method, you can assign up to 30 parameter values and you must specify at least two. Each parameter value must be a range of cells. You specify the ranges for the `Intersect` method by using any option that returns a valid `Range` object, such as the `Range` property or the `Cells` property. See the sections, "Using the Range Property" and "Using the Cells Property," for more information on the `Range` and `Cells` properties.

The following example uses the Intersect method:

```
Dim NewRange As Range

Set NewRange = _
    Intersect(Range("A1:C5"),Range("C1:E5"))
```

This example assigns the intersection of A1:C5 and C1:E5, which is C1:C5, to the object variable `NewRange`.

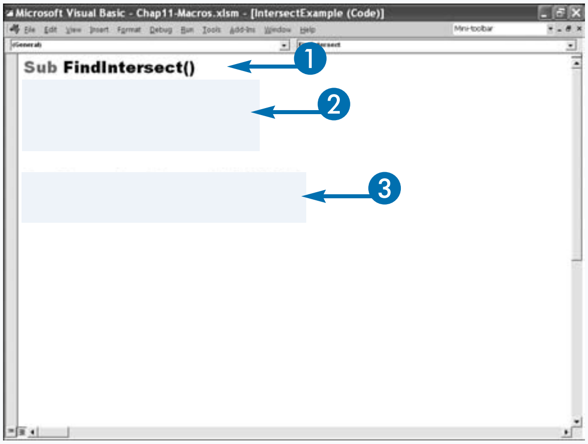
Because you must declare the variable to which you assign the multiple-area range as a `Range` object, use the `Set` statement as part of the assignment statement. You must use the `Set` statement whenever you assign an object to a variable. When you assign an intersecting range to a range object variable, the `Intersect` method only assigns the cells in the intersection of the range to the variable. See Chapter 4 for more information on assigning objects.

Find the Intersection of Two Ranges

① Name your procedure.

② Declare your `Range` objects.

③ Assign your ranges to your object variables.

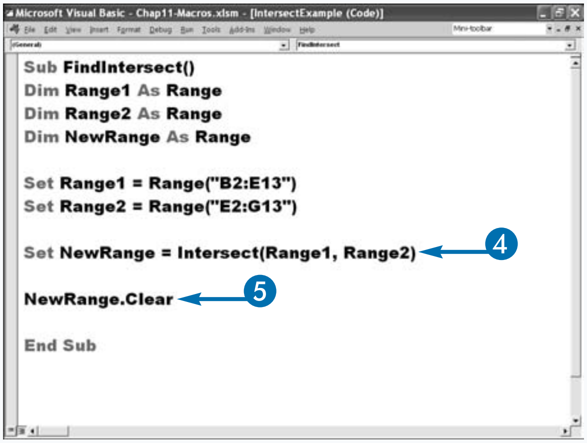

Microsoft Visual Basic - Chap11-Macros.xlsm - [IntersectExample (Code)]
1
2
3

```
Sub FindIntersect()
```

④ Create a range from the intersection of the two ranges.

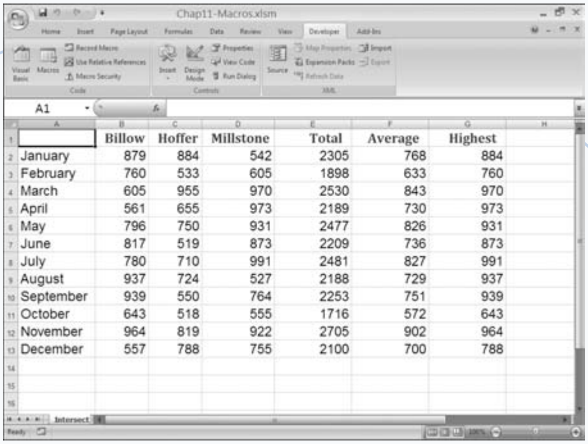
⑤ Clear the intersection range.

⑥ Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap11-Macros.xlsm - [IntersectExample (Code)]
4
5

```
Sub FindIntersect()
Dim Range1 As Range
Dim Range2 As Range
Dim NewRange As Range

Set Range1 = Range("B2:E13")
Set Range2 = Range("E2:G13")

Set NewRange = Intersect(Range1, Range2)

NewRange.Clear

End Sub
```

The worksheet before you run your macro.


Chap11-Macros.xlsm
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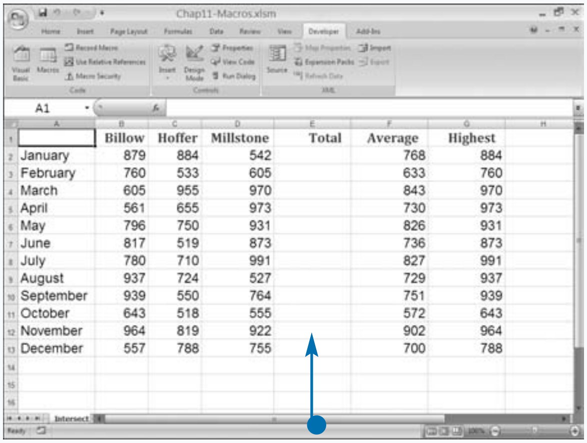
	Billow	Hoffer	Millstone	Total	Average	Highest
January	879	884	542	2305	768	884
February	760	533	605	1898	633	760
March	605	955	970	2530	843	970
April	561	655	973	2189	730	973
May	796	750	931	2477	826	931
June	817	519	873	2209	736	873
July	780	710	991	2481	827	991
August	937	724	527	2188	729	937
September	939	550	764	2253	751	939
October	643	518	555	1716	572	643
November	964	819	922	2705	902	964
December	557	788	755	2100	700	788

The worksheet after you run your macro.

- The macro clears the intersection range.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Intersect
Ready

	Billow	Hoffer	Millstone	Total	Average	Highest
January	879	884	542		768	884
February	760	533	605		633	760
March	605	955	970		843	970
April	561	655	973		730	973
May	796	750	931		826	931
June	817	519	873		736	873
July	780	710	991		827	991
August	937	724	527		729	937
September	939	550	764		751	939
October	643	518	555		572	643
November	964	819	922		902	964
December	557	788	755		700	788

Extra

You can use one of the `Clear` methods to clear the contents of a cell or range of cells in your worksheet. The `Clear` method clears the entire contents, including cell values, formatting, and formulas, from the specified cells. The following is an example of the `Clear` method:

Example:

```
RangeVar.Clear
```

Use the `ClearFormats` method to clear all formatting from the specified range. All cell values and formulas remain in the cells. With this method, the contents of the specified range use default-formatting options. The following is an example of the `ClearFormats` method:

Example:

```
RangeVar.ClearFormats
```

You can clear the cell values and formulas from a range of cells by using the `ClearContents` method. This method clears everything except the formatting that you applied to the cells. When you add new values to the cells in the range after you have cleared the range, Excel uses the applied formatting. The following is an example of the `ClearContents` method:

Example:

```
RangeVar.ClearContents
```

Cut and Paste Ranges of Cells

Cut, Copy, and Paste are among the most commonly used commands, and you can find them in almost every application. When writing VBA code, you can use the `Cut` and `Copy` methods to cut, copy, and paste a range of cells. The following is the syntax for the `Cut` method (see "Copy and Paste Ranges of Cells" for an explanation of the `Copy` method):

```
expression.Cut([Destination])
```

The `Cut` method enables you to cut a range of cells and paste them either to the Windows Clipboard or to another range of cells. The `expression` identifies the range you want to cut. You can use the `Cut` method's optional `Destination` parameter to tell VBA where you want to paste. If you do not include a destination, VBA pastes to the Windows Clipboard.

If you include a destination, you can use a `Range` object to specify the location to which you want to paste. The following example uses the `Cut` method to cut and paste a range of cells:

```
Range("A1:A5").Cut Range("C1:C5")
```

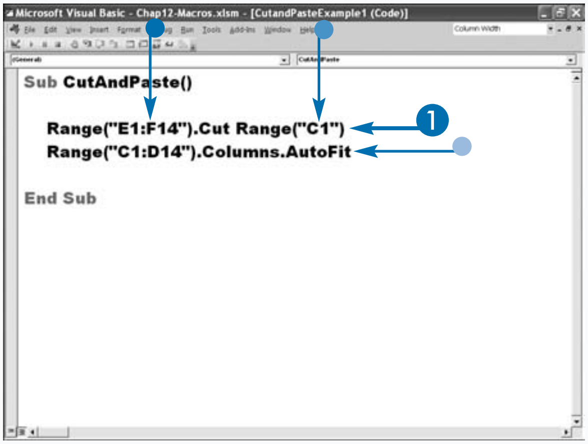
When using this syntax, you must make the cut range and the destination range the same size or VBA returns an error. Alternatively, you can specify a single cell as the destination range. VBA makes the cell you specify the upper-left corner of the paste range.

Cut and Paste Ranges of Cells

CUT AND PASTE A SINGLE CELL

① Create your `Cut` statement.

- The range you are cutting.
- The upper-left corner of the range to which you are pasting.
- This code resizes columns to ensure that the contents display in the cells.



Microsoft Visual Basic - Chap12-Macros.xlsm - [CutandPasteExample1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Column Width
(General)
CutAndPaste
1

```
Sub CutAndPaste()

    Range("E1:F14").Cut Range("C1")
    Range("C1:D14").Columns.AutoFit

End Sub
```

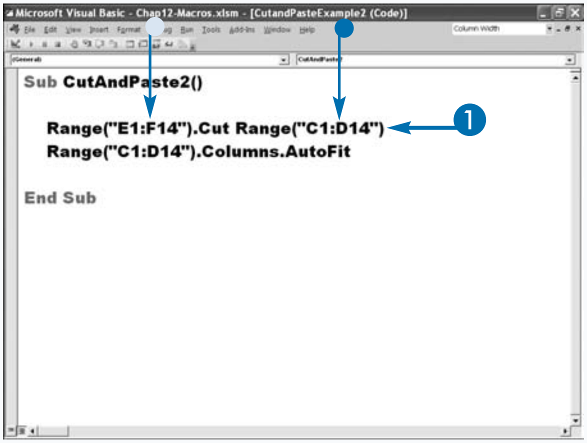
CUT AND PASTE A RANGE OF CELLS

① Create your Cut statement.

- The range you are cutting.
- The range to which you are pasting.

***Note:** The range from which you cut must be the same size as the range to which you paste.*

② Press Alt+F11 to switch from the VBE to Excel, and run the macro.



Microsoft Visual Basic - Chap12-Macros.xlsm - [CutandPasteExample2 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Column Width
(General)
CutAndPaste
1

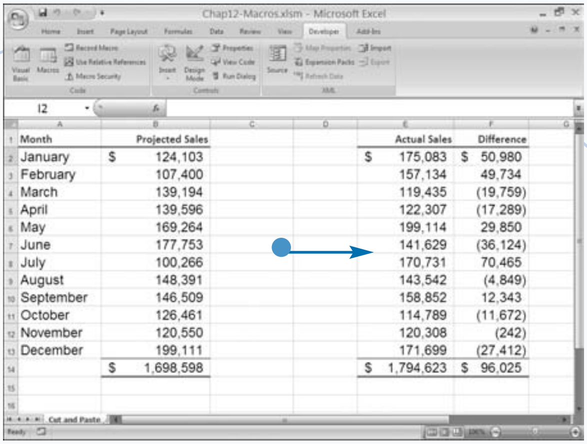
```
Sub CutAndPaste2()

    Range("E1:F14").Cut Range("C1:D14")
    Range("C1:D14").Columns.AutoFit

End Sub
```

The original worksheet.

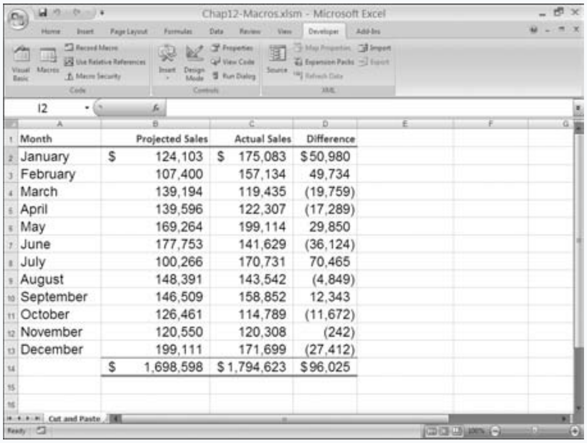
- The macro cuts and pastes this information.



Month	Projected Sales			Actual Sales	Difference
January	$ 124,103			$ 175,083	$ 50,980
February	107,400			157,134	49,734
March	139,194			119,435	(19,759)
April	139,596			122,307	(17,289)
May	169,264			199,114	29,850
June	177,753			141,629	(36,124)
July	100,266			170,731	70,465
August	148,391			143,542	(4,849)
September	146,509			158,852	12,343
October	126,461			114,789	(11,672)
November	120,550			120,308	(242)
December	199,111			171,699	(27,412)
	$ 1,698,598			$ 1,794,623	$ 96,025

The worksheet after the cut-and-paste macro has executed.

Both of the macros shown in this example yield the same result.



Month	Projected Sales	Actual Sales	Difference
January	$ 124,103	$ 175,083	$50,980
February	107,400	157,134	49,734
March	139,194	119,435	(19,759)
April	139,596	122,307	(17,289)
May	169,264	199,114	29,850
June	177,753	141,629	(36,124)
July	100,266	170,731	70,465
August	148,391	143,542	(4,849)
September	146,509	158,852	12,343
October	126,461	114,789	(11,672)
November	120,550	120,308	(242)
December	199,111	171,699	(27,412)
	$ 1,698,598	$ 1,794,623	$96,025

Apply It

When you paste values in cells, the cells may not be able to hold the new content. If the values you paste are numeric and the cells are not wide enough for the numbers, Excel displays pound signs (####) in the cells. When you write a VBA procedure, VBA provides formatting options you can use to resize cells so that your values fit into the cells to which you paste them. For example, you can use the `AutoFit` method to resize the rows and columns. The `AutoFit` method uses the following syntax:

Example:

```
Range("C1:D14").Columns.AutoFit
```

You can use the `ShrinkToFit` property to reduce the font size of the text so the entire contents of the cell display. You set the `ShrinkToFit` property by assigning the Range property the value of `True`, as shown in the following example:

Example:

```
Range("C1:D14").ShrinkToFit=True
```

You can also use the `WrapText` property to ensure text displays properly. Assigning a value of `True` to the `WrapText` property causes text to wrap within the cell.

Example:

```
Range("C1:D14").WrapText=True
```

Copy and Paste Ranges of Cells

In this section, you learn how to *copy* and *paste* a range of cells. You can copy and paste cell ranges by using the `Copy` method. The `Copy` method is essentially the same as the Copy and Paste commands within Excel. The following is the syntax for the `Copy` method:

```
expression.Copy([Destination])
```

The `Copy` method enables you to copy a range of cells and paste them either to the Windows Clipboard or to another range of cells. The Copy method enables you to copy a range of cells and paste them either to the Windows Clipboard or to another range of cells. The expression identifies the range you want to copy. You can use the `Copy` method's optional `Destination` parameter to tell VBA where you want to paste the cells. If you do not include a destination, VBA pastes the cells to the Windows Clipboard.

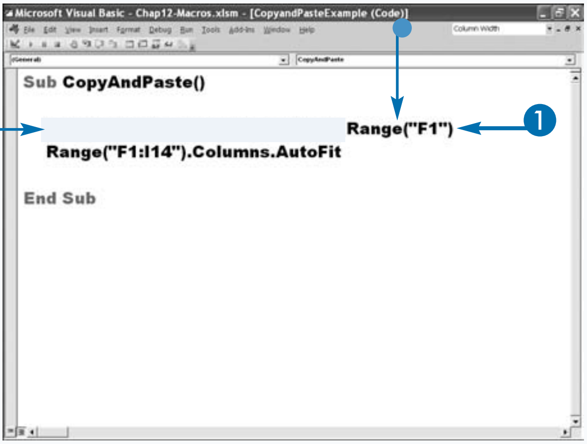
If you include a destination, you can use a `Range` object to specify the location to which you want to paste. The following code illustrates using the `Copy` method to cut and paste a range of cells:

```
Range("A1:A5").Copy Range("C1:C5")
```

When using this syntax, you must make the copy range and the destination range the same size or VBA returns an error. Alternatively, you can specify a single cell as the destination range. VBA makes the cell you specify the upper-left corner of the paste range.

A block of cells surrounded by blank cells is called the *current region*. You can use the `CurrentRegion` property to copy and paste or to cut and paste when using VBA. When entering the range, you specify any cell within the block of cells you want to cut or copy as the range, and then follow the range specification with `.CurrentRegion`.

Copy and Paste a Range of Cells



```
Sub CopyAndPaste()

                              Range("F1")
  Range("F1:I14").Columns.AutoFit

End Sub
```

Microsoft Visual Basic - Chap12-Macros.xlsm - [CopyandPasteExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Column Width
(General)
CopyAndPaste
1

COPY AND PASTE BY USING A SINGLE CELL

① Create your `Copy` statement.

- The range from which you are copying.

  This example uses CurrentRegion.

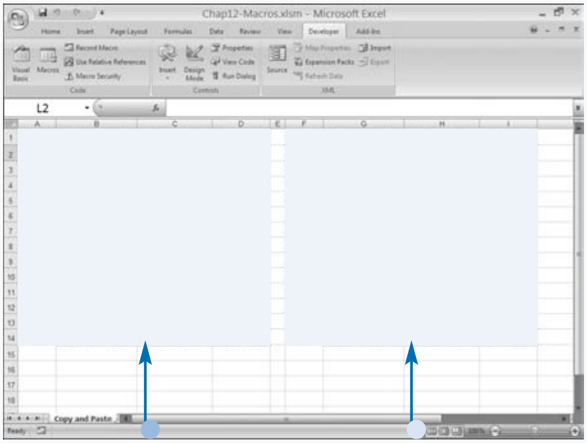
  The CurrentRegion property enables you to manipulate a range of cells without specifying the entire range.

- The upper-left corner of the range to which you are pasting.

② Press Alt+F11 to switch from the VBE to Excel, and run the macro.

  The macro copies and pastes the information.

- The range you copied.
- The pasted data.



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Code
Insert
Design Mode
Properties
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Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
L2
A B C D E F G H I
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
Copy and Paste
Ready

COPY AND PASTE BY USING A RANGE OF CELLS

① Create your `Copy` statement.

- The range from which you are copying.
- The range to which you are copying.

  The range to which you copy must be the same size as the range from which you copy.

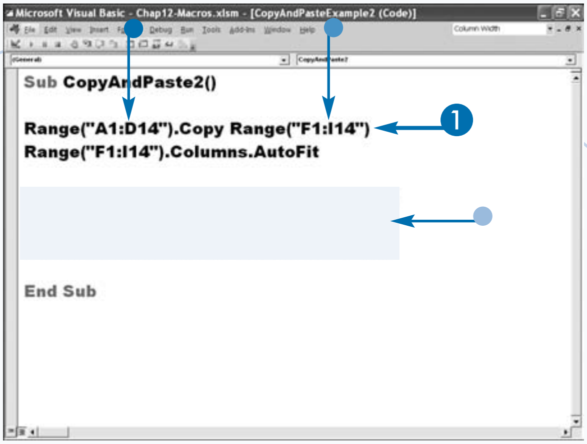
- Formats the copy to range.

  Changes the color of the interior of cells, the border that surrounds cells, and the font

② Press Alt+F11 to switch from the VBE to Excel, and run the macro.

The macro copies and pastes the information.

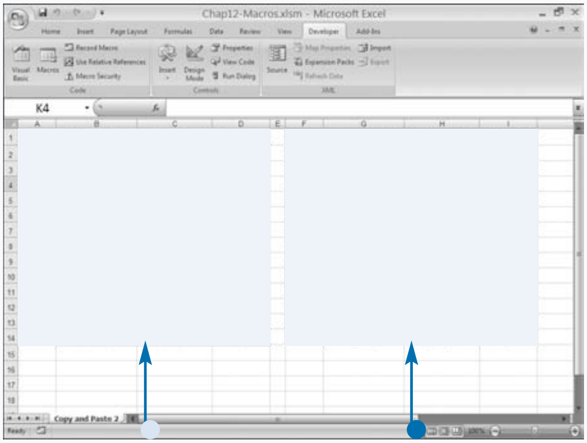
- The range you copied.
- The pasted information.


Microsoft Visual Basic - Chap12-Macros.xlsm - [CopyAndPasteExample2 (Code)]
(General)
CopyAndPaste2
1

```
Sub CopyAndPaste2()

Range("A1:D14").Copy Range("F1:I14")
Range("F1:I14").Columns.AutoFit


End Sub
```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Copy and Paste 2
Ready

Extra

You can use the `ColorIndex` property with the `Interior`, `Borders`, and `Font` objects to change the color of the interior of cells, the border that surrounds cells, and the font. You can assign an index value of 1 to 56 to the `ColorIndex` property to assign the color you want. The following example demonstrates the `ColorIndex` property.

Examples:

```
Range("F1:I14").Interior.ColorIndex = (1)
Range("F1:I14").Borders.ColorIndex = (2)
Range("F1:I14").Font.ColorIndex = (2)
```

The following table lists 16 of the possible colors you can use with the `ColorIndex` property. Refer to VBA help for a complete list.

INDEX	COLOR
1	Black
2	White
3	Red
4	Green
5	Blue
6	Yellow
7	Fuchsia
8	Light Blue
9	Brown
10	Forest Green
11	Navy Blue
12	Yellow-Brown
13	Maroon
14	Blue-Green
15	Light Gray
16	Gray

Using Paste Special Options When Pasting

Cells can contain a lot of information. When you use the `PasteSpecial` method, you decide exactly what information you want to paste. You can choose to paste everything or you can choose to paste just one element of the cell's contents, such as the formula, value, or column width. You can also use the `PasteSpecial` method to perform simple arithmetic operations on each cell in a range. For example, in a list of salaries, you may want to increase every salary by five percent. You can use the `PasteSpecial` method to make the change quickly. Just copy the value by which you want to multiply to the Clipboard and then use `xlPasteSpecialOperationMultiply` when you paste with the `PasteSpecial` method.

You can use the `PasteSpecial` method with values you have added to the Windows Clipboard using the `Cut` or `Copy` methods. The following is the syntax for the `PasteSpecial` method:

```
expression.PasteSpecial(Paste, Operation,
SkipBlanks, Transpose)
```

Use the `Paste` parameter to indicate how you want to paste the information into the new range. By default, Excel uses the `xlPasteAll` constant value for this parameter, which pastes the entire contents of the copied or cut cells into the new range.

Use the `Operation` parameter to perform a mathematical operation, such as multiplying the current value of a cell by the pasted value. The default constant value used by Excel is `xlPasteSpecialOperationNone`, which does not perform any mathematical operations.

Set the `SkipBlanks` parameter to `True` if you do not want to overwrite a destination cell with a blank cell if the destination cell contains data in it and the copied cell does not.. If you want to transpose the data values from rows to columns or vice versa, set the `Transpose` parameter to `True`.

Using Paste Special Options When Pasting

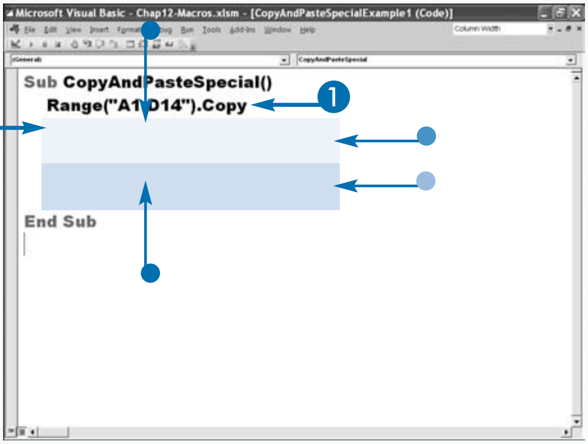
PASTE PARAMETER

① Copy a range of cells to the Clipboard.

Do not include the `Destination` parameter.

② Type your `PasteSpecial` command.

- ● The range to which you are pasting.
- ● This statement pastes the column widths, thereby making sure that the source column widths match the destination column widths.
- ● This statement pastes the data.


Microsoft Visual Basic - Chap12-Macros.xlsm - [CopyAndPasteSpecialExample1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Column Width
(General)
CopyAndPasteSpecial
①
②

```
Sub CopyAndPasteSpecial()
    Range("A1:D14").Copy
End Sub
```

OPERATION PARAMETER

① Copy a cell to the Clipboard.

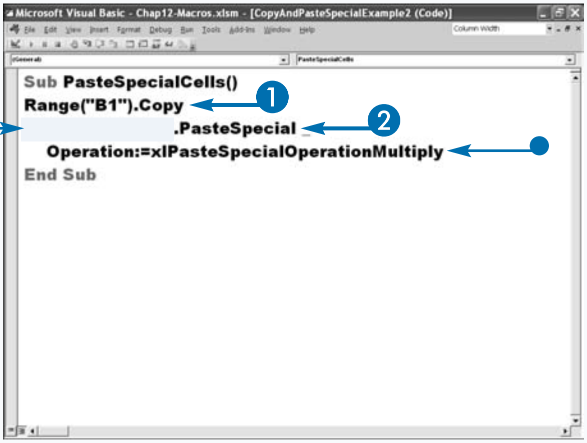
In this example, cell B1 contains the number needed to calculate an annual salary increase.

② Type your PasteSpecial command.

- ● The range to which you are pasting.

In this example, range B5 to B10 contains the salaries you want to increase.

- ● The Operation parameter.

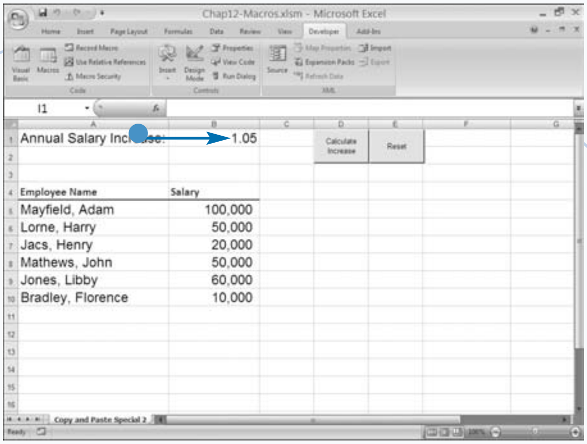

Microsoft Visual Basic - Chap12-Macros.xlsm - [CopyAndPasteSpecialExample2 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Column Width
(General)
PasteSpecialCells
①
②

```
Sub PasteSpecialCells()
Range("B1").Copy
              .PasteSpecial _
    Operation:=xlPasteSpecialOperationMultiply
End Sub
```

③ Press Alt+F11 to switch from the VBE to Excel, and run the macro.

The worksheet before you run the macro.

- The cell you copied.

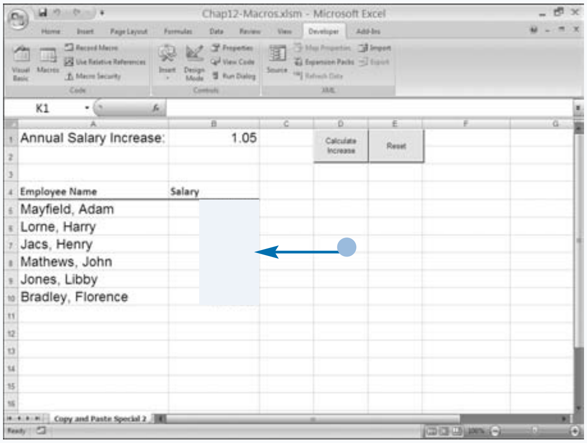

Chap12-Macros.xlsm - Microsoft Excel
I1
Calculate Increase
Reset
Copy and Paste Special 2
Ready

Annual Salary Increase:	1.05
Employee Name	Salary
Mayfield, Adam	100,000
Lorne, Harry	50,000
Jacs, Henry	20,000
Mathews, John	50,000
Jones, Libby	60,000
Bradley, Florence	10,000

The worksheet after you run the macro.

- The `PasteSpecial` range.

The macro multiplies each cell in the `PasteSpecial` range by the value in the cell you copied.


Chap12-Macros.xlsm - Microsoft Excel
K1
Calculate Increase
Reset
Copy and Paste Special 2
Ready

Annual Salary Increase:	1.05
Employee Name	Salary
Mayfield, Adam	
Lorne, Harry	
Jacs, Henry	
Mathews, John	
Jones, Libby	
Bradley, Florence	

Extra

The `Paste` parameter requires one of the following constant values.

NAME	DESCRIPTION
xlPasteAll	The default value, which pastes the entire contents of the cells.
xlPasteAllExceptBorders	Pastes everything except border settings.
xlPasteAllUsingSourceTheme	Pastes everything using the source theme.
xlPasteColumnWidths	Pastes the column widths.
xlPasteComments	Pastes the cell comments only.
xlPasteFormats	Pastes the formats only.
xlPasteFormulas	Pastes the formulas only.
xlPasteFormulasAndNumberFormats	Pastes the formulas and number formats.
xlPasteValidation	Pastes the cell validation only.
xlPasteValues	Pastes the cell values only.
xlPasteValuesAndNumberFormats	Pastes the cell values and number formats.

You can use the following values with the Operation parameter:

`xlPasteSpecialOperationAdd`, `xlPasteSpecialOperationSubtract`, `xlPasteSpecialOperationMultiply`, `xlPasteSpecialOperationDivide`, and `xlPasteSpecialOperationNone`.

Add Comments to a Cell

When several people work on a single workbook, comments can provide useful information. Excel associates a comment with an individual cell and indicates its presence with a small, red triangle in the cell's upper-right corner. You can view a comment by clicking in the cell or by moving your cursor over the cell. In VBA, by using the `AddComment` method with the `Range` object, you can add a comment to any cell in your worksheet.

When the user creates a comment in Excel, Excel adds the user's name to the comment. When you create a comment by using the `AddComment` method, VBA does not automatically include a username. The following is the syntax for the `AddComment` method:

```
expression.AddComment(Text)
```

The `expression` is the variable or range object that represents the cell to which you want to add a comment. The following code adds a comment to cell A1:

```
Cells(1,1).AddComment "Sample Comment Text"
```

If you want to add the same comment to multiple cells, you can use a looping statement, such as a `Do Until` loop, to cycle through the range of cells. See Chapter 6 to learn more about loops.

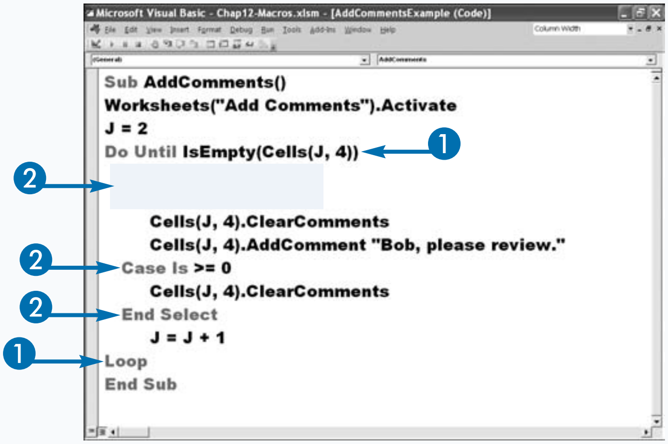
If you attempt to add a comment to a cell that already contains a comment, Excel returns an error message. To avoid errors, you can use the `ClearComments` method to clear an existing comment from a cell. The following is an example of the `ClearComments` method:

```
Cells(1,1).ClearComments
```

Add Comments to a Cell

① Add a loop, if you are going to loop through a series of cells.

② Add Case statements, if you are going to add comments selectively.


Microsoft Visual Basic - Chap12-Macros.xlsm - [AddCommentsExample (Code)]
(General)
AddComments
1
2
2
2
1

```
Sub AddComments()
Worksheets("Add Comments").Activate
J = 2
Do Until IsEmpty(Cells(J, 4))

        Cells(J, 4).ClearComments
        Cells(J, 4).AddComment "Bob, please review."
  Case Is >= 0
        Cells(J, 4).ClearComments
  End Select
        J = J + 1
Loop
End Sub
```

③ Add a `ClearComments` statement.

- The range.

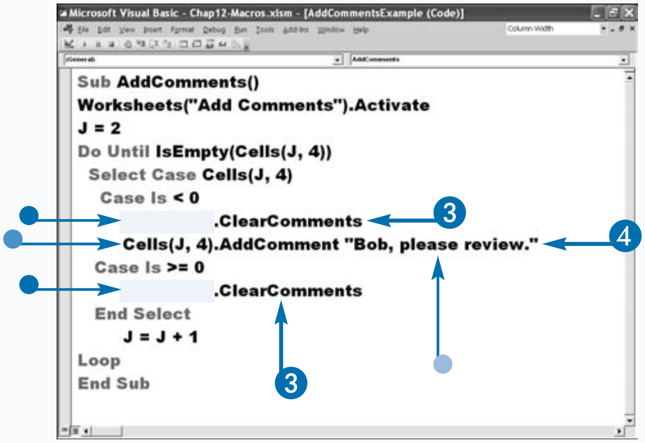
The ClearComments statement clears any comments that are already in the cell.

④ Add an AddComment statement.

- The range.
- The comment.

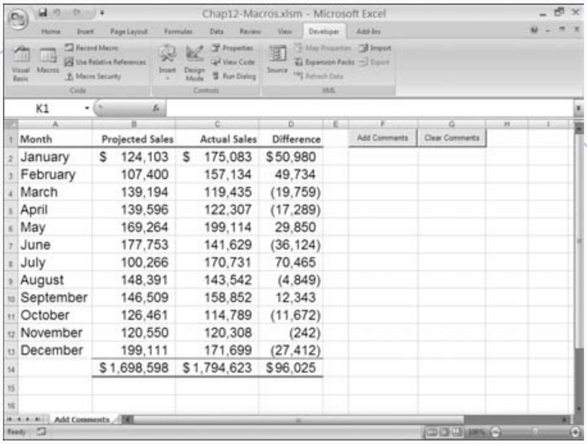
The AddComment statement adds comments to your worksheet.

⑤ Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap12-Macros.xlsm - [AddCommentsExample (Code)]
(General)
AddComments
3
4
3

```
Sub AddComments()
Worksheets("Add Comments").Activate
J = 2
Do Until IsEmpty(Cells(J, 4))
 Select Case Cells(J, 4)
   Case Is < 0
        .ClearComments
        Cells(J, 4).AddComment "Bob, please review."
  Case Is >= 0
        .ClearComments
  End Select
        J = J + 1
Loop
End Sub
```

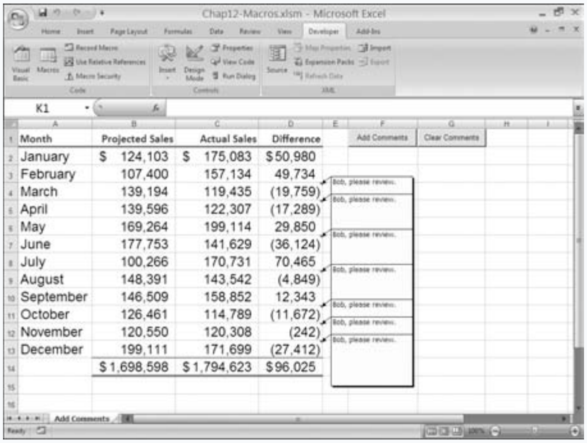
The worksheet before you run the macro.


Chap12-Macros.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
K1
Add Comments
Clear Comments
Add Comments
Ready

Month	Projected Sales	Actual Sales	Difference
January	$ 124,103	$ 175,083	$50,980
February	107,400	157,134	49,734
March	139,194	119,435	(19,759)
April	139,596	122,307	(17,289)
May	169,264	199,114	29,850
June	177,753	141,629	(36,124)
July	100,266	170,731	70,465
August	148,391	143,542	(4,849)
September	146,509	158,852	12,343
October	126,461	114,789	(11,672)
November	120,550	120,308	(242)
December	199,111	171,699	(27,412)
	$ 1,698,598	$ 1,794,623	$96,025

The worksheet after you run the macro.

The macro adds the comments to your worksheet.


Chap12-Macros.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
K1
Add Comments
Clear Comments
Add Comments
Ready

Month	Projected Sales	Actual Sales	Difference
January	$ 124,103	$ 175,083	$50,980
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July	100,266	170,731	70,465
August	148,391	143,542	(4,849)
September	146,509	158,852	12,343
October	126,461	114,789	(11,672)
November	120,550	120,308	(242)
December	199,111	171,699	(27,412)
	$ 1,698,598	$ 1,794,623	$96,025

Bob, please review.
Bob, please review.
Bob, please review.
Bob, please review.
Bob, please review.
Bob, please review.
Bob, please review.

Apply It

When you add a comment to a cell, Excel creates a `Comment` object for that cell. The `Comment` object is part of the `Comments` collection, which contains all comments within a particular range of cells. You can reference particular comments in a worksheet using the `Comments` collection and an index value. For example, to access the second comment in a worksheet, you would type the following:

Example:

```
SecondComment=ActiveSheet.Comments(2).Text
```

You can also use the properties of the `Comment` object. If you want comments to automatically display on the worksheet, you can set the `Visible` property to `True` as shown below.

Example:

```
Cells(1,1).Comment.Visible = True
```

You may want to delete comments that a particular author created. The `Comment` object provides an `Author` property that you can use to return the author of a comment. Excel adds the author when it creates a comment. The following example deletes a comment by a particular author:

Example:

```
CountComments = ActiveSheet.Comments.Count
For N = 1 To CountComments
      If Comment(N).Author = "John Smith" Then
           Comment(N).Delete
      End If
Next
```

Automatically Fill a Range of Cells

In Excel, AutoFill helps you quickly enter data when a data series has an intrinsic order such as days of the week, months of the year, or numeric increments. You can use the `AutoFill` method to create an AutoFill using VBA. The following is the syntax for the `AutoFill` method:

```
expression.AutoFill(Destination, Type)
```

The `expression` is the variable or range object that represents the cell or cells you want to use when you create an AutoFill. VBA uses the values in this source range to determine the type of values to add to the cells in the destination range. For example, if the source range is cells A1 and A2 and the cells contain the values January and February, respectively, then Excel fills the cells in the destination range with the months of the year starting with March.

The `AutoFill` method has two parameters, `Destination` and `Type`. The `Destination` parameter, which is required, must contain a range indicating which cells to fill. The `Destination` range must encompass the source range. For example, if the source range is A1 and A2, these cells must be included in the destination range, as shown in the following example:

```
Range("A1:A2").AutoFill _
   Destination:=Range("A1:A12").
```

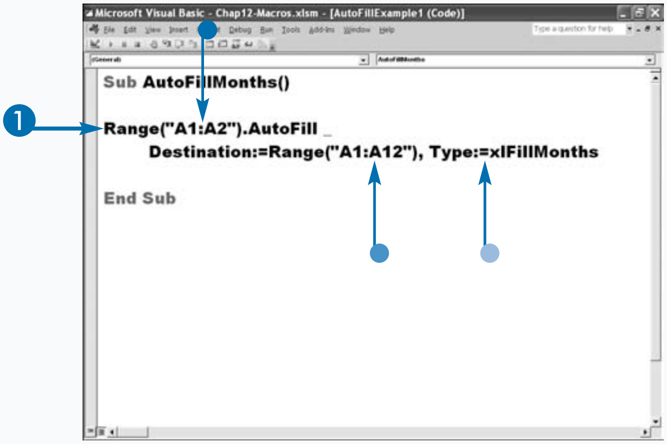
VBA uses the values in the source range to determine the pattern you want to use when adding values to the cells in the destination. If you want to tell VBA the pattern to use to add values to the destination, you must include the `Type` parameter. The `Type` parameter accepts an `xlAutoFillType` constant, which specifies the type of fill.

Automatically Fill a Range of Cells

FILL A RANGE

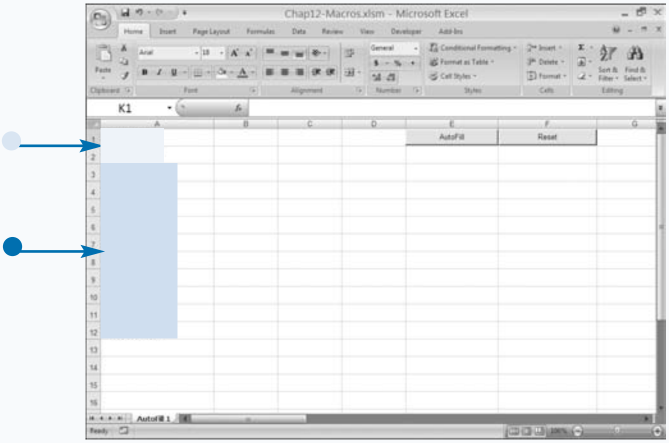
1. Type your AutoFill command.
   - The range you want to use as the source.
   - The cells you want to fill.
   - The fill type.

     This example uses months.
2. Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap12-Macros.xlsm - [AutoFillExample1 (Code)]
(General)
AutoFillMonths
1

```
Sub AutoFillMonths()

Range("A1:A2").AutoFill _
    Destination:=Range("A1:A12"), Type:=xlFillMonths

End Sub
```

- The worksheet after you run the macro.
- The source cells.
- The destination cells.



CREATE AN AUTOFILL

1. Create your AutoFill command.
   - The range you want to use as the source.

     This example uses the active cell, which is the first cell in your selection.
   - The cells you want to fill.

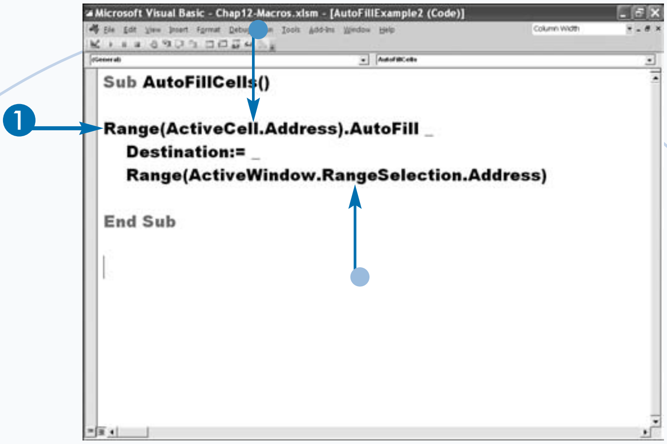
     This example uses your selection.

     No fill type is given, as VBA bases the fill type on the cell you use as the source.
2. Press Alt+F11 to switch from the VBE to Excel, and run the macro.

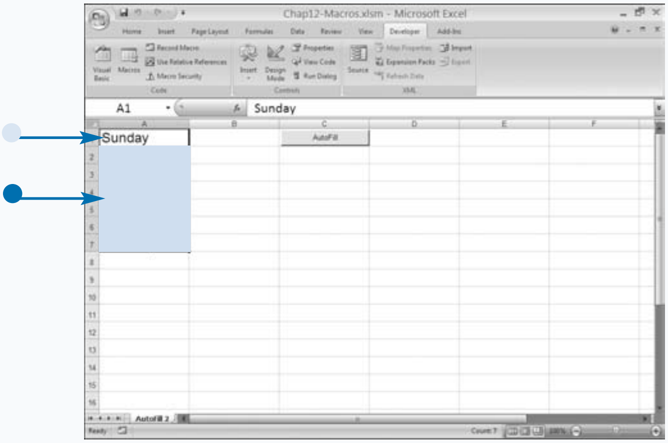
   The worksheet after you run the macro.

   The macro fills the cells.
   - The source cell.
   - The fill.

     You must type the first value in the range, select the cells you want to fill, and then press Enter.


Microsoft Visual Basic - Chap12-Macros.xlsm - [AutoFillExample2 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
AutoFillCells
1

```
Sub AutoFillCells()
Range(ActiveCell.Address).AutoFill _
   Destination:= _
   Range(ActiveWindow.RangeSelection.Address)

End Sub
```


Chap12-Macros.xlsm - Microsoft Excel
Home Insert Page Layout Formulas Data Review View Developer Add-Ins
Visual Basic Macros Record Macro Use Relative References Macro Security
Insert Design Mode Properties View Code Run Dialog Source
A1
Sunday
AutoFill
AutoFill 2
Ready

Extra

The `XlAutoFillType` constant values specify how Excel fills the range of cells for the `Destination` parameter. The following table describes each of the `XlAutoFillType` constant values.

CONSTANT	DESCRIPTION
`xlFillDays`	Increments the values by days. If only one date is specified for the source, it increments by one day. If multiple dates are specified, it uses those dates to determine the increment value.
`xlFillFormats`	Applies the formats of the source cells to the destination cells.
`xlFillSeries`	Creates a series based upon the contents of the source range.
`xlFillWeekdays`	Increments based on weekdays, omitting dates that fall on Saturday or Sunday.
`xlGrowthTrend`	Fills cells based on a growth trend.
`xlFillCopy`	Copies the formatting and values, and increments based on source values.
`xlFillDefault`	The default value. Excel determines the fill type based upon values in the source cells.
`xlFillMonths`	Increments by month.
`xlFillValues`	Copies the values in the source cells.
`xlFillYears`	Increments the year portion of the date.
`xlLinearTrend`	Fills cells based on a linear trend.

Copy a Range to Multiple Sheets

You can copy a range of cells and place the contents in the same location on multiple sheets with the `FillAcrossSheets` method. When you use this method, Excel copies the cells you specify to each worksheet you specify. You can copy everything in the range of cells, just the values in the cells, or just the formatting. The following is the syntax for the `FillAcrossSheets` method:

`*expression*.FillAcrossSheets(Range, Type)`

The `expression` is the variable or object that represents the list of worksheets to which VBA copies the range of cells. The worksheets must exist within the current workbook and you must include the worksheet that you are copying from in the list.

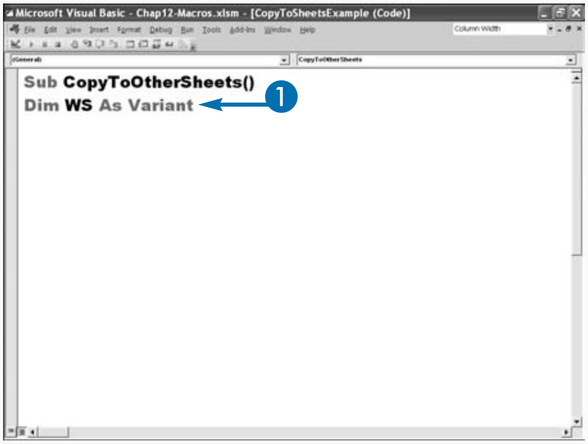
The `FillAcrossSheets` method has two parameters: `Range` and `Type`. The `Range` parameter, which is required, specifies the range of cells you want to copy to the other worksheets. You can specify the range of cells using any valid range statement. See Chapter 11 for more information on specifying ranges.

The `Type` parameter is optional. Use this parameter to tell VBA what you want to copy. The `Type` parameter accepts one of the three `XlFillWith` constant values. If you do not specify a `Type` parameter, VBA uses the default value of `XlFillWithAll`, which copies the entire contents of the range of cells, including the formatting. If you only want to copy the cell values, use the `XlFillWithContents` constant value. This constant value instructs Excel to copy everything but the cell formatting. If you only want to copy the formatting, use the `XlFillWithFormats` constant value. When you use `XlFillWithFormats`, Excel ignores the values and applies the formatting only.

Copy a Range to Multiple Sheets

① Declare a variable to store your array.

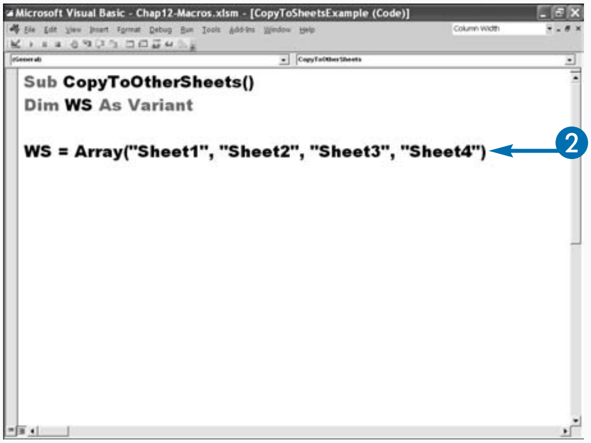
You use an array to store the list of worksheets to which you want to copy.



```
Sub CopyToOtherSheets()
Dim WS As Variant
```

Microsoft Visual Basic - Chap12-Macros.xlsm - [CopyToSheetsExample (Code)]
(General)
CopyToOtherSheets
①

② Create your array and store it to the variable you created.



```
Sub CopyToOtherSheets()
Dim WS As Variant

WS = Array("Sheet1", "Sheet2", "Sheet3", "Sheet4")
```

Microsoft Visual Basic - Chap12-Macros.xlsm - [CopyToSheetsExample (Code)]
(General)
CopyToOtherSheets
②

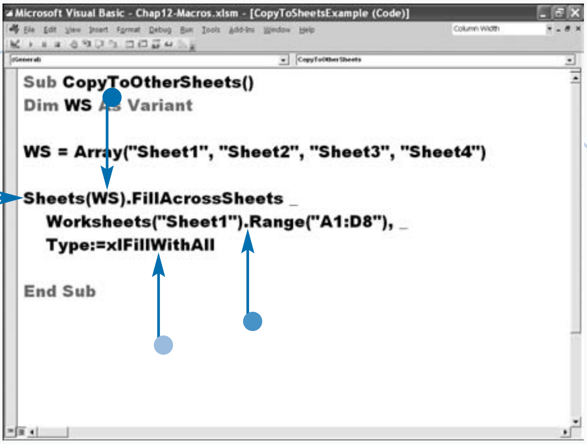
3. Add your `FillAcrossSheets` command.

- The sheets to which you want to copy.
- The range you want to copy.
- What you want to copy.

  Use `XlFillWithAll` to copy everything.

  Use `XlFillWithContents` to copy the contents only.

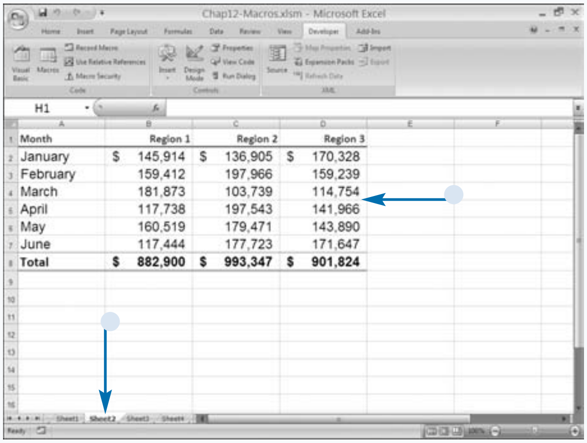
  Use `XlFillWithFormats` to copy the formats only.


Microsoft Visual Basic - Chap12-Macros.xlsm - [CopyToSheetsExample (Code)]
(General)
CopyToOtherSheets
3

```
Sub CopyToOtherSheets()
Dim WS As Variant

WS = Array("Sheet1", "Sheet2", "Sheet3", "Sheet4")

Sheets(WS).FillAcrossSheets _
   Worksheets("Sheet1").Range("A1:D8"), _
   Type:=xlFillWithAll

End Sub
```

4. Press Alt+F11 to switch from the VBE to Excel, and run the macro.

- Your macro copies the range you specified to the worksheets you specified.



	A	B	C	D
1	Month	Region 1	Region 2	Region 3
2	January	$ 145,914	$ 136,905	$ 170,328
3	February	159,412	197,966	159,239
4	March	181,873	103,739	114,754
5	April	117,738	197,543	141,966
6	May	160,519	179,471	143,890
7	June	117,444	177,723	171,647
8	Total	$ 882,900	$ 993,347	$ 901,824

Apply It

You can fill a range of cells in a specific direction within a worksheet using one of the fill methods. For example, you may want to fill across a worksheet with the first value in the left corner of the range. VBA offers four Range object methods for filling in a specific direction: `FillUp`, `FillDown`, `FillRight`, and `FillLeft`.

You can use the `FillUp` method to fill a range of cells with the value specified in the last cell of the range. For example, if you have the range A1:A10 and you apply the `FillUp` method, as shown here, the value in cell A10 copies and pastes in cells A1:A9.

Example:

```
Range("A1:A10").FillUp
```

The `FillDown` method works opposite to the `FillUp` method. This method takes the value in the top of the range and copies it to all the other cells.

You can use the `FillRight` method to fill across rows. For example, if you use this method with the range `A1:G1`, Excel takes the value in cell A1 and pastes it into cells B1 to G1. The `FillLeft` method works opposite to the `FillRight` method. This method takes the value in the last cell on the right and copies it to all cells to the left.

Place a Border Around a Range of Cells

When creating an Excel worksheet, you can highlight important information by adding a border. A border adds color to the lines that surround a range of cells. In VBA, you can add borders to a range of cells using the `BorderAround` method. When you use this method, the border outlines the range, not each individual cell. The `BorderAround` method uses the following syntax:

```
expression.BorderAround(LineStyle, Weight,
ColorIndex, Color)
```

The expression identifies the range you want to place the border around. Use an `XlLineStyle` constant value to set the style of the line. If you do not set an `XlLineStyle`, VBA uses the default value, `XlContinuous`, to draw a continuous line around the range of cells. Use an `XlBorderWeight` constant value to set the `Weight` of the line. If you do not set a `Weight`, VBA uses the default value `xlThin`, which draws a thin line around the range of cells. VBA sets either the line style or the line weight, not both.

You can use either a `ColorIndex` or the `RGB` function to set the color of a border; however, you cannot use both. Use a `ColorIndex` value between 1 and 64. See the section, "Copy and Paste Ranges," for a partial list of `ColorIndex` values. Set the `ColorIndex` to `xlColorIndexAutomatic` to use the default line color.

If you want to use an RGB color value to assign a color, use the `Color` parameter and assign it an RGB color with the `RGB` function. When you use the `RGB` function, you specify three values from 0 to 255 indicating the red, green, and blue component values.

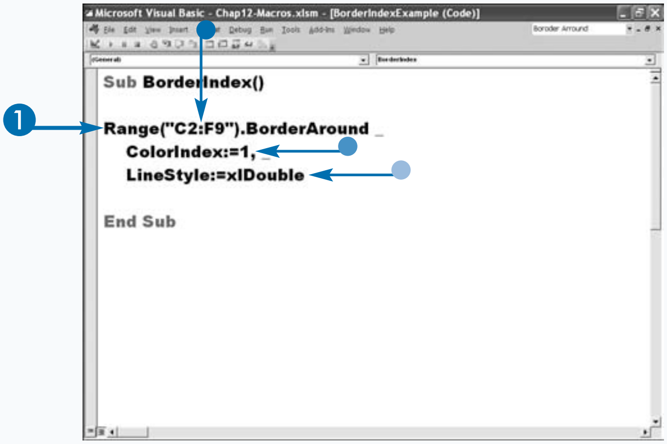
Place a Border Around a Range of Cells

COLOR INDEX BORDER

① Create your `BorderAround` command.

- The range that the border surrounds.
- The color index.
- The line style.

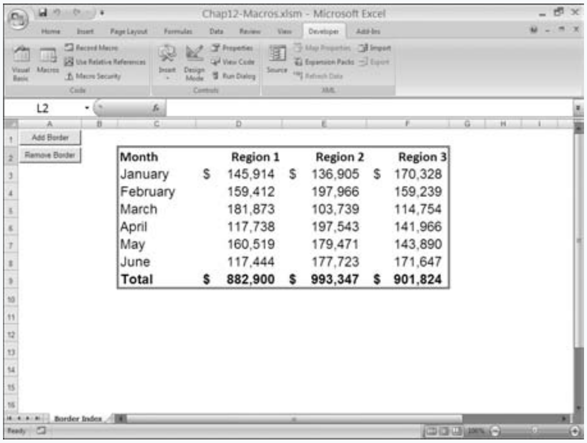
② Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap12-Macros.xlsm - [BorderIndexExample (Code)]
(General)
BorderIndex
1

```
Sub BorderIndex()

Range("C2:F9").BorderAround _
  ColorIndex:=1, _
  LineStyle:=xlDouble

End Sub
```

The worksheet after you run your macro.

VBA places a border around the range you specified.



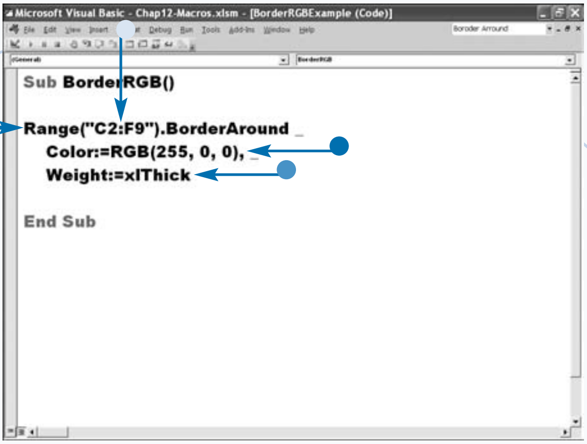
Month		Region 1		Region 2		Region 3
January	$	145,914	$	136,905	$	170,328
February		159,412		197,966		159,239
March		181,873		103,739		114,754
April		117,738		197,543		141,966
May		160,519		179,471		143,890
June		117,444		177,723		171,647
Total	**$**	**882,900**	**$**	**993,347**	**$**	**901,824**

RGB COLOR BORDER

① Create your `BorderAround` command.

- The range that the border surrounds.
- The RGB color.
- The weight.

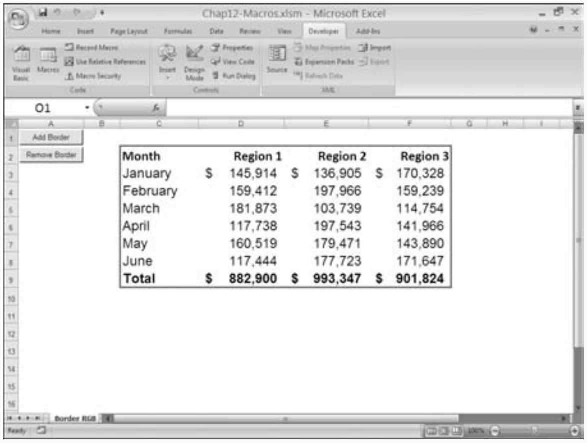
② Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap12-Macros.xlsm - [BorderRGBExample (Code)]
(General)
BorderRGB
1

```
Sub BorderRGB()
    Range("C2:F9").BorderAround _
        Color:=RGB(255, 0, 0), _
        Weight:=xlThick

End Sub
```

The worksheet after you run your macro.

VBA places a border around the range you specified.


Chap12-Macros.xlsm - Microsoft Excel
Add Border
Remove Border
Border RGB
Ready

Month	Region 1	Region 2	Region 3
January	$ 145,914	$ 136,905	$ 170,328
February	159,412	197,966	159,239
March	181,873	103,739	114,754
April	117,738	197,543	141,966
May	160,519	179,471	143,890
June	117,444	177,723	171,647
Total	$ 882,900	$ 993,347	$ 901,824

Extra

You use the `XlBorderWeight` constant values, `xlHairline`, `xlMedium`, `xlThick`, and `xlThin`, to specify the width of the line used to draw a border around a range of cells.

VBA bases the style of line that it draws upon the `xlLineStyle` parameter. You use the `xlLineStyle` constant values, outlined in this table, to specify the line style.

CONSTANT	DESCRIPTION
`xlContinuous`	The default value, which draws a continuous line around the range of cells.
`xlDash`	Draws a dashed line around the range of cells.
`xlDashDot`	Draws a broken line using a dash-dot pattern.
`xlDashDotDot`	Draws a broken line using a dash-dot-dot pattern.
`xlDot`	Draws a dotted line around the range of cells.
`xlDouble`	Draws a double continuous line around the range of cells.
`xlLineStyleNone`	Does not modify the line style.
`xlSlantDashDot`	Draws a broken line in a dash-dot pattern using a slanted line.

Find Specific Cell Values

You can use the `Find` method to search for a value within a range of cells. This method is similar to the Find command in Excel. The following is the syntax for the `Find` method:

```
expression.Find(What, After, LookIn,
LookAt, SearchOrder, SearchDirection,
MatchCase)
```

The expression identifies the range you want to search. The `What` parameter is the only required parameter. You can use the `What` parameter to tell VBA what you want to find. You can use the `After` parameter to tell VBA the cell before which you want to start searching. If you omit this parameter, Excel starts the search with the top-left cell in the range. The `LookIn` parameter tells VBA what you want to search. You can assign one of the `xlFindLookIn` constants: `xlValues` searches cell values, `xlComments` searches comments, and `xlFormulas` searches formulas.

The `LookAt` parameter tells VBA how to match your search criteria. Assign the `LookAt` parameter `xlWhole` if you want your search criteria to match the contents of the cell exactly; assign `xlPart` if you want VBA to return a match if your search criteria is found anywhere in the cell.

The `xlSearchOrder` parameter tells VBA the order in which you want to search. Assign the value `xlByRows` if you want to search by rows, or assign the value `xlByColumns` if you want to search by columns.

Use the `SearchDirection` parameter to indicate the direction you want to search. A value of `xlNext` finds the next matching value. A value of `xlPrevious` finds the previous matching value. Assign `True` to the `MatchCase` parameter if you want your search to be case-sensitive.

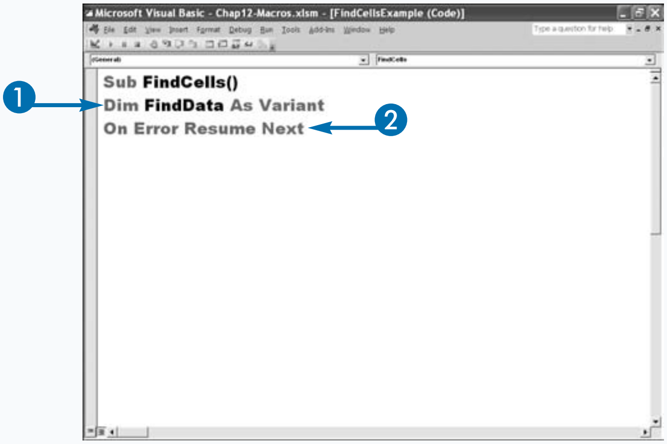
Find Specific Cell Values

In this example, the user enters a value in a cell and VBA searches a range for the value.

① Declare the variable VBA uses to store the search criteria.

② Type **On Error Resume Next**.

This statement tells VBA to continue processing if an error occurs.

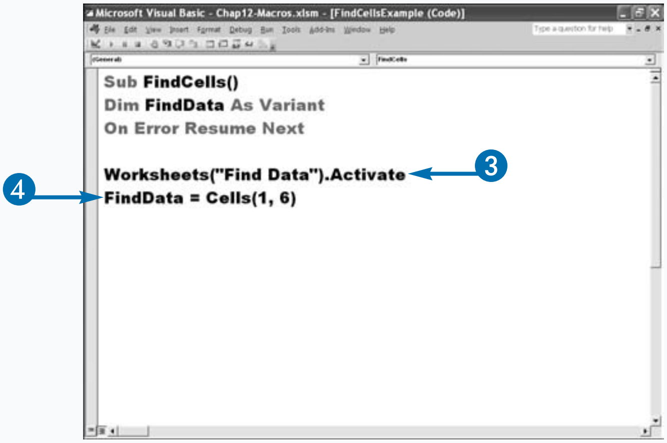

Microsoft Visual Basic - Chap12-Macros.xlsm - [FindCellsExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
FindCells
1
2

```
Sub FindCells()
Dim FindData As Variant
On Error Resume Next
```

③ Activate the relevant worksheet.

If a procedure only works with a particular worksheet, activate the worksheet.

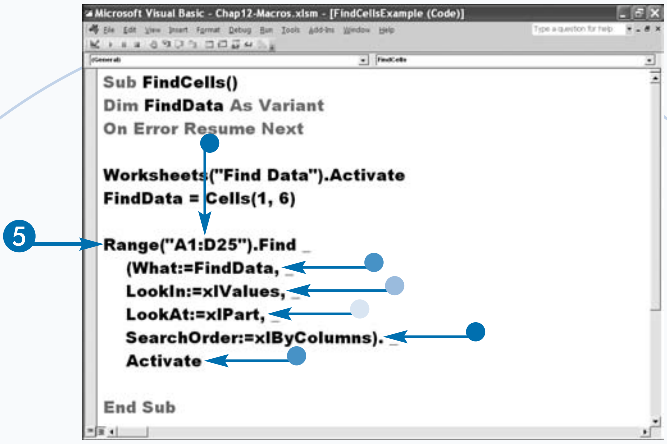
④ Store the contents of the cell in which the user enters the search criteria to a variable.


Microsoft Visual Basic - Chap12-Macros.xlsm - [FindCellsExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
FindCells
3
4

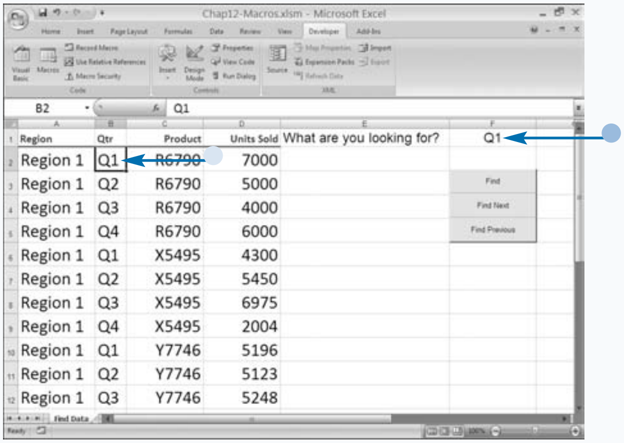
```
Sub FindCells()
Dim FindData As Variant
On Error Resume Next

Worksheets("Find Data").Activate
FindData = Cells(1, 6)
```

5. Type your Find command.
   - The range you want to search.
   - The data for which you are searching.

     In this example, the data is stored in the `FindData` variable.
   - What you want to search.
   - How you want to match your search criteria.
   - The search order.
   - Your instruction as to what VBA should do when it finds the item for which you are searching.
6. Press Alt+F11 to switch from the VBE to Excel, and run the macro.
   - The cell in which the user places the search criteria.
   - When you execute the macro, if VBA finds the item, Excel moves to the first instance of the item for which you are looking.


Microsoft Visual Basic - Chap12-Macros.xlsm - [FindCellsExample (Code)]
(General)
FindCells
5

```
Sub FindCells()
Dim FindData As Variant
On Error Resume Next

Worksheets("Find Data").Activate
FindData = Cells(1, 6)

Range("A1:D25").Find _
   (What:=FindData, _
   LookIn:=xlValues, _
   LookAt:=xlPart, _
   SearchOrder:=xlByColumns). _
   Activate

End Sub
```



	A	B	C	D	E	F
1	Region	Qtr	Product	Units Sold	What are you looking for?	Q1
2	Region 1	Q1	R6790	7000		
3	Region 1	Q2	R6790	5000		
4	Region 1	Q3	R6790	4000		
5	Region 1	Q4	R6790	6000		
6	Region 1	Q1	X5495	4300		
7	Region 1	Q2	X5495	5450		
8	Region 1	Q3	X5495	6975		
9	Region 1	Q4	X5495	2004		
10	Region 1	Q1	Y7746	5196		
11	Region 1	Q2	Y7746	5123		
12	Region 1	Q3	Y7746	5248		

Extra

The introduction to this task does not mention two `Find` method parameters: `MatchByte` and `SearchFormat`. If you have installed double-byte language support on your computer, assign the value `True` to the `MatchByte` parameter.

The `SearchFormat` parameter enables you to match formats. If you assign the value `True` to this parameter, you must specify the format for the `Application.FindFormat` object.

VBA remembers the values specified for the `What`, `LookIn`, `LookAt`, `SearchOrder`, and `MatchByte` parameters. If you run a search again without setting these parameter values, Excel uses the settings from the previous `Find` or `Replace` method execution. These values are also set when you run a Find or Replace from within Excel. To avoid running searches that have unexpected results, you should set these parameters each time you run the `Find` method.

You can continue a search and find the next match using the `FindNext` or `FindPrevious` methods. When using these methods, you must specify an `After` parameter. The `After` parameter tells Excel the cell after which you want to execute the next search.

Example:

```
SearchRange.FindNext(After)
SearchRange.FindPrevious
(After)
```

Find and Replace Values in Cells

You can use the `Replace` method to search for and replace values within a range of cells. This method is similar to the Find and Replace command in Excel. The following is the syntax for the `Replace` method:

```
expression.Replace(What, Replacement,
LookAt, SearchOrder, MatchCase,
SearchFormat, ReplaceFormat)
```

The expression identifies the range you want to search. The `Replace` method has two required parameters: `What` and `Replacement`. The `What` parameter tells VBA what you want to find. The `Replacement` parameter tells VBA with what you want to replace the data you find.

The `LookAt` parameter tells VBA how to match your search criteria. You can assign the `LookAt` parameter `xlWhole` if you want your search criteria to match the contents of the cell exactly. You can assign `xlPart` if you want VBA to return a match if your search criteria is found anywhere in the cell.

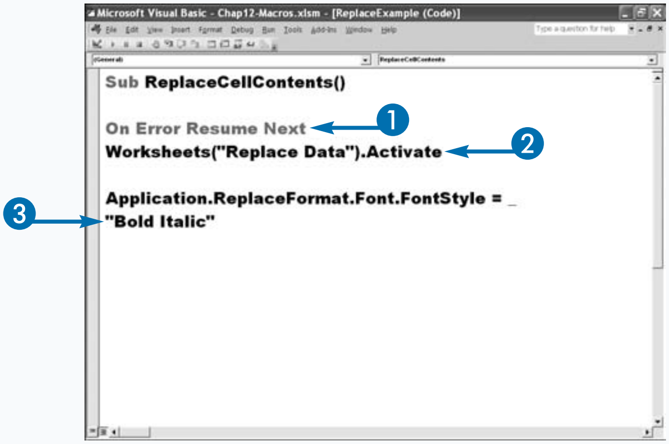
The `xlSearchOrder` parameter tells VBA the order in which you want to search. You can assign the value `xlByRows` if you want to search by rows, or assign the value `xlByColumns` if you want to search by columns.

You can assign `True` to the `MatchCase` parameter if you want your search to be case-sensitive.

The `SearchFormat` and the `ReplaceFormat` parameters tell VBA the format you want to search for or replace. If you want to search for or replace a format, then you must set the appropriate parameter to `True` and specify the format properties for the `Application.FindFormat` object or the `ReplaceFormat` object, or both. For example, to replace text with a bold format, you can use the following code:

```
Application.ReplaceFormat.Font.FontStyle =
"Bold"
```

Find and Replace Values in Cells


Microsoft Visual Basic - Chap12-Macros.xlsm - [ReplaceExample (Code)]
(General)
ReplaceCellContents
1
2
3

```
Sub ReplaceCellContents()

On Error Resume Next
Worksheets("Replace Data").Activate

Application.ReplaceFormat.Font.FontStyle = _
"Bold Italic"
```

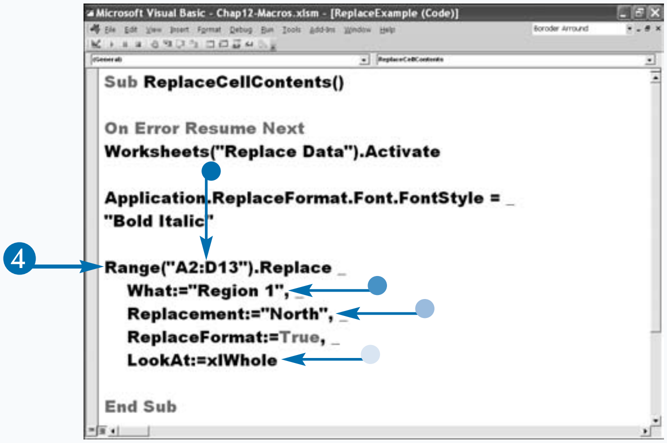
① Type **On Error Resume Next**.

This statement tells VBA to continue processing if an error occurs.

② Activate the relevant worksheet.

③ Type your `ReplaceFormat` or `FindFormat` command.

In this example, you make the replacement text bold and italic.


Microsoft Visual Basic - Chap12-Macros.xlsm - [ReplaceExample (Code)]
(General)
ReplaceCellContents
4

```
Sub ReplaceCellContents()

On Error Resume Next
Worksheets("Replace Data").Activate

Application.ReplaceFormat.Font.FontStyle = _
"Bold Italic"

Range("A2:D13").Replace _
   What:="Region 1", _
   Replacement:="North", _
   ReplaceFormat:=True, _
   LookAt:=xlWhole

End Sub
```

④ Type your Replace command.

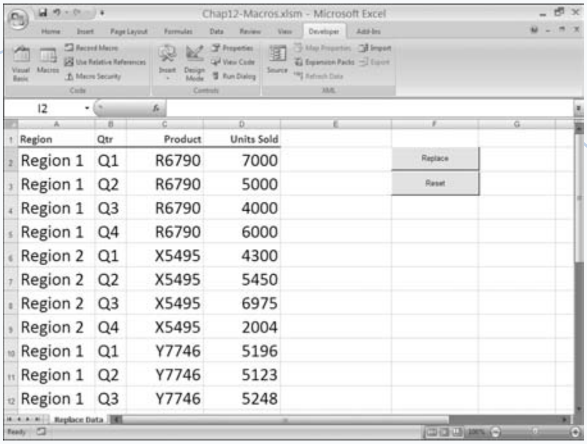
- The range you want to search.
- The data for which you are searching.
- Your replacement.

  Your `ReplaceFormat` object is set to `True`.

  VBA will use your `ReplaceFormat` command.
- How you want to match your search criteria.

5 Press Alt+F11 to switch from the VBE to Excel, and run the macro.

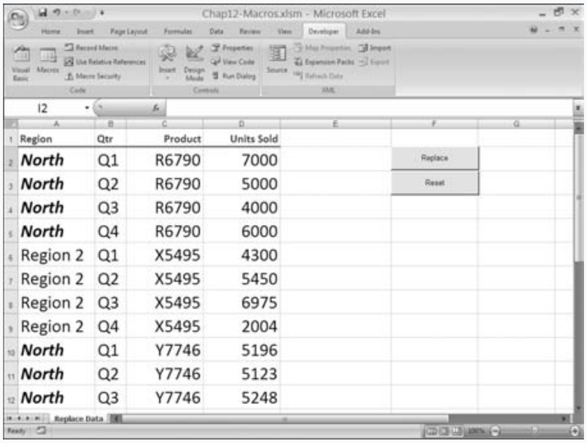
Your worksheet before you execute your macro.



Region	Qtr	Product	Units Sold
Region 1	Q1	R6790	7000
Region 1	Q2	R6790	5000
Region 1	Q3	R6790	4000
Region 1	Q4	R6790	6000
Region 2	Q1	X5495	4300
Region 2	Q2	X5495	5450
Region 2	Q3	X5495	6975
Region 2	Q4	X5495	2004
Region 1	Q1	Y7746	5196
Region 1	Q2	Y7746	5123
Region 1	Q3	Y7746	5248

Your worksheet after you execute your macro.

The macro replaces the Region 1 text with North and applies bold and italics.



Region	Qtr	Product	Units Sold
North	Q1	R6790	7000
North	Q2	R6790	5000
North	Q3	R6790	4000
North	Q4	R6790	6000
Region 2	Q1	X5495	4300
Region 2	Q2	X5495	5450
Region 2	Q3	X5495	6975
Region 2	Q4	X5495	2004
North	Q1	Y7746	5196
North	Q2	Y7746	5123
North	Q3	Y7746	5248

Extra

When you specify a value of `True` for the `SearchFormat` parameter or for the `ReplaceFormat` parameter, VBA looks for the search or replacement format settings. If you want to use formatting as part of the search criteria, you need to specify the format settings by using the `FindFormat` property of the Application object. With the `ReplaceFormat` parameter, you need to specify the replacement format settings by using the `ReplaceFormat` property. Set these properties at the top of the procedure, before the code that sets the associated parameter. You can use these properties to set the `Font` object properties for searching and replacing text. You can use the `With` statement to set the property values. For example, to set replacement text properties, you can type code similar to the following:

Example:

```
With Application.ReplaceFormat.Font
          .Name = "Arial"
          .FontStyle = "Bold"
          .Size = 12
End With
```

UserForm Basics

Every Windows application uses dialog boxes to gather information from the user, and Excel is no exception. For example, you can use the Open dialog box in Excel to select a file to open. VBA has two ready-made dialog boxes, MsgBox and InputBox, that you can use with your code. In addition, you can create you own custom dialog boxes. See Chapter 7 for more information on the MsgBox and InputBox dialog boxes.

Parts of the Visual Basic Editor

By using the VBE, you can create custom dialog boxes to use with your Excel procedures. The VBE refers to these custom dialog boxes as UserForms. When you create a UserForm, you design it by using the various controls available in the Toolbox.

Arrow Button

Label Button

Textbox Button

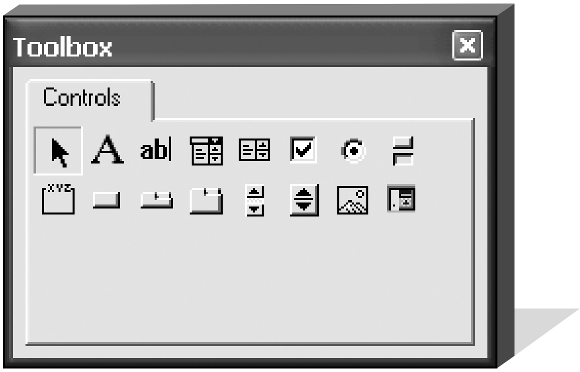
Combobox Button

Listbox Button

Checkbox Button

Option Button

Toggle Button



Frame Button

Command Button

Tabstrip Button

Multipage Button

Scrollbar Button

Spin Button

Image Button

Refedit Button

Visual Basic Editor Toolbox

The VBE Toolbox appears only when you select a `UserForm` in the VBE. The Toolbox contains controls that you can add to your custom `UserForm`. See the section, “Create a Custom Dialog Box,” for more information about adding Toolbox controls.

The Toolbox contains several standard controls that you can add to a `UserForm`. You can also create custom controls and add them to the Toolbox. See the section, “Create Custom `UserForm` Controls,” for more information on adding custom controls.

Label

For adding text to a `UserForm`. This control is not designed to interact with the `UserForm`; you add labels for informational purposes only.

TextBox

Enables the user to type in text.

ComboBox

A user can either click an item from the list or type the appropriate value.

ListBox

Presents a list of items from which a user can select the desired item.

CheckBox

A user can select or deselect options. Typically, a CheckBox control returns a value of `True` if it is selected, and `False` if it is not selected.

OptionButton

A user can select from a list of items. You place Option Button controls in a group. When the user selects a control, the other controls are automatically deselected.

ToggleButton

The button appears to be either pressed or unpressed. When pressed, the button returns a value of `True`; when unpressed the button returns a value of `False`.

Frame

This control is a container for grouped controls.

TabStrip

A multiple-page area for a section of your UserForm.

CommandButton

A user clicks a button to perform a specific action. When you create a CommandButton control, you specify the text that displays on the button as part of the control property.

MultiPage

Tabbed dialog boxes with which a user can switch between pages of options in the dialog box.

By default, when you add the MultiPage control to your UserForm, it creates two pages. To add additional pages, right-click one of the Page tabs and select the New Page option.

ScrollBar

A user can scroll through information that is not on the screen, or indicate a position on a scale.

SpinButton

A user can specify a value by clicking one of the arrow buttons to increment or decrement the value.

Image

Use this control to add a graphic to the UserForm. Excel stores the graphic in the worksheet. If you distribute the worksheet, Excel includes the graphic. You can use a graphic that is in any of the following file formats: BMP, CUR, GIF, ICO, JPEG, and WMF.

RefEdit

A text field and a button with which a user can select a range of cells from a worksheet. When the user clicks a button, the corresponding dialog box minimizes so that the user can drag the pointer across the worksheet to select the desired range of cells.

Create a Custom Dialog Box

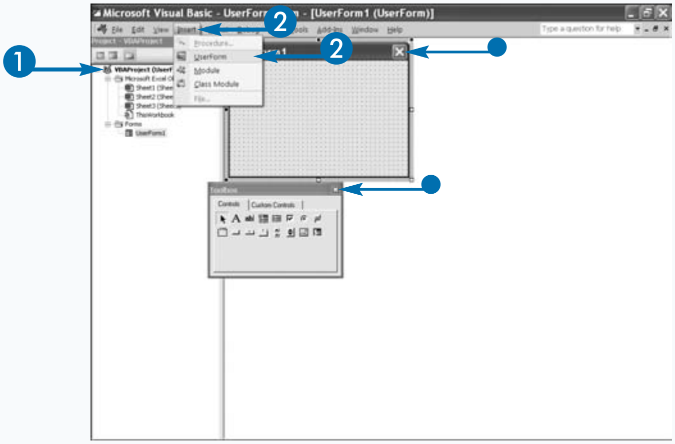
You can create custom dialog boxes to use with any of your macros. Dialog boxes are a user interface that enable users to click buttons to indicate a desired selection or type appropriate values in a field. You can use VBA to create custom dialog boxes. VBA refers to these dialog boxes as Forms or UserForms.

To create a custom dialog box in the VBE, select the UserForm option on the View menu. The VBE creates a new UserForm called UserForm# and creates a Forms folder in the Project Explorer window. The Forms folder displays only if you have created UserForms. See Chapter 2 for more information about the Project Explorer window.

You can change the name of a UserForm to make it easier to identify when you look at the UserForms list in the Project Explorer window by changing the Name property in the Properties window. To open the Properties window press F4.

After you create a UserForm, you can custom design it by using the Toolbox controls, which only appear when you select the UserForm window. You add controls to the UserForm by dragging them from the Toolbox to the appropriate location on the UserForm. For example, to request a text value from the user, you drag the TextBox control onto the UserForm. After you add a control, you can resize it as needed. The VBE assigns default values to the control's properties. You can change the assigned values in the Properties window. You must select the control on the UserForm before you can set the properties.

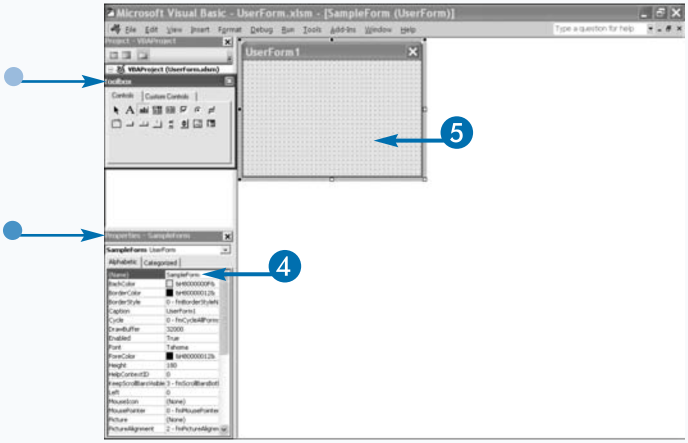
Create a Custom Dialog Box


Microsoft Visual Basic - UserForm.xlsm - [UserForm1 (UserForm)]
2
2
1
Procedure...
UserForm
Module
Class Module
File...
VBAProject (UserForm.xlsm)
Microsoft Excel Objects
Sheet1 (Sheet1)
Sheet2 (Sheet2)
Sheet3 (Sheet3)
ThisWorkbook
Forms
UserForm1
Toolbox
Controls
Custom Controls

① In the Project Explorer window, click the project to which you want to add a UserForm.

② Click Insert ➔ UserForm.

- The VBE creates a blank UserForm with a default name of UserForm1, and the Toolbox appears.


Microsoft Visual Basic - UserForm.xlsm - [SampleForm (UserForm)]
UserForm1
Toolbox
Controls
Custom Controls
5
4
Properties - SampleForm
SampleForm UserForm
Alphabetic
Categorized

(Name)	SampleForm
BackColor	&H8000000F&
BorderColor	&H80000012&
BorderStyle	0 - fmBorderStyleN
Caption	UserForm1
Cycle	0 - fmCycleAllForm
DrawBuffer	32000
Enabled	True
Font	Tahoma
ForeColor	&H80000012&
Height	180
HelpContextID	0
KeepScrollBarsVisible	3 - fmScrollBarsBoth
Left	0
MouseIcon	(None)
MousePointer	0 - fmMousePointer
Picture	(None)
PictureAlignment	2 - fmPictureAlignm

③ Press F4.

- The Properties window appears.

④ Type a form name in the Name field of the Properties window.

⑤ Click the UserForm.

- The Toolbox reappears.

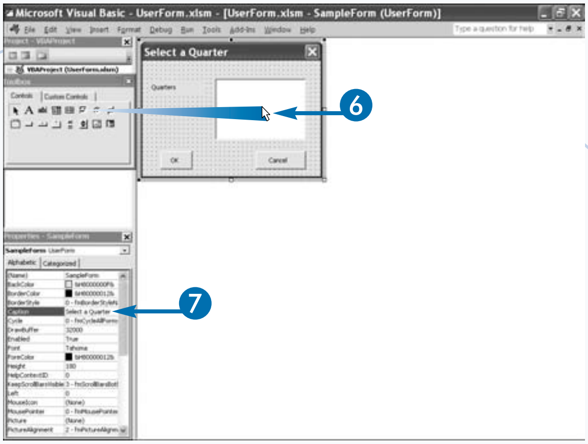
6. Click and drag a control from the Toolbox to the UserForm.

   Continue adding controls as needed.

7. Type captions in the caption field.

   Use the Properties window to change any properties you want to change.

8. Press F5.


Microsoft Visual Basic - UserForm.xlsm - [UserForm.xlsm - SampleForm (UserForm)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Toolbox
Controls
Custom Controls
Select a Quarter
Quarters
OK
Cancel
6
7

Properties - SampleForm

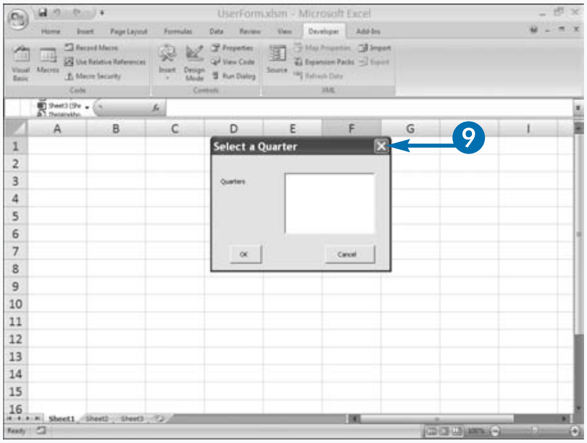
SampleForm UserForm

Alphabetic | Categorized

(Name)	SampleForm
BackColor	&H8000000F&
BorderColor	&H80000012&
BorderStyle	0 - fmBorderStyleN
Caption	Select a Quarter
Cycle	0 - fmCycleAllForms
DrawBuffer	32000
Enabled	True
Font	Tahoma
ForeColor	&H80000012&
Height	180
HelpContextID	0
KeepScrollBarsVisible	3 - fmScrollBarsBoth
Left	0
MouseIcon	(None)
MousePointer	0 - fmMousePointer
Picture	(None)
PictureAlignment	2 - fmPictureAlignm

The VBE moves you to Excel and provides you with a preview of the dialog box.

9. To return to the VBE, click the Close button in the dialog box.


UserForm.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Visual Basic
Macros
Record Macro
Use Relative References
Macro Security
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
A
B
C
D
E
F
G
I
Select a Quarter
Quarters
OK
Cancel
Sheet1
Sheet2
Sheet3
Ready
100%
9

Extra

You can specify several properties for each control you add to a UserForm. Although each control type has unique properties, most of the properties are common to all controls. To change the value of a control, either type a new value or click a value from the drop-down list. The following table describes some common control properties.

CONTROL PROPERTY	DESCRIPTION
(Name)	The name of the control.
BackColor	The background color of the control.
Caption	The text that displays on the control, such as the button text.
Font	The font used to display all values on the control.
Height	The height of the control in pixels.
Text	The default text value of the control.
TextAlign	The way text aligns on the control.
Width	The width of the control in pixels.

Call a Custom Dialog Box from a Procedure

You can call and display custom dialog boxes. Moreover, you can use custom dialog boxes to obtain user input. For example, you can use a dialog box to request the values you need from the user to perform a calculation.

To display a custom dialog box, use the `Show` method of the UserForm object. The `Show` method instructs Excel to display the specified UserForm. The `Show` method has one optional parameter, modal. The following is the syntax for the `Show` method:

```
UserForm.Show modal
```

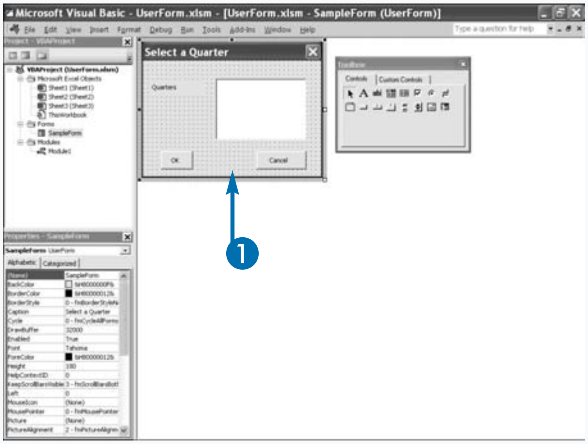
The `Modal` parameter determines whether the UserForm displays as a modal or modeless dialog box in Excel. The default value of `vbModal` makes the dialog box modal, which means that users must either close or hide the dialog box before selecting any other options in Excel. When Excel opens a modal dialog box, Excel passes control to the dialog box, and the user can only interact with the dialog box. A value of `vbModeless` means that although the dialog box remains open until a user closes it, the user can perform other functions.

Dialog boxes contain a Close or Cancel button a user can click to close the dialog box. In a procedure, you can also close a dialog box by using the `Unload` method. You must use a `Click` event with `CommandButton` controls to create a procedure that calls the `Unload` method. See the section, "Capture Input from a Custom Dialog Box," for more information about specifying the code to run when a user clicks a button.

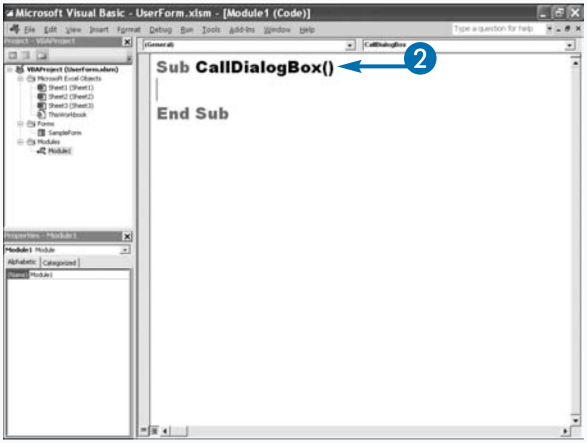
Call a Custom Dialog Box from a Procedure

① Create a UserForm.

Note: *See the section, "Create a Custom Dialog Box," to learn how to create a UserForm.*


Microsoft Visual Basic - UserForm.xlsm - [UserForm.xlsm - SampleForm (UserForm)]
Select a Quarter
Quarters
OK
Cancel
Toolbox
1

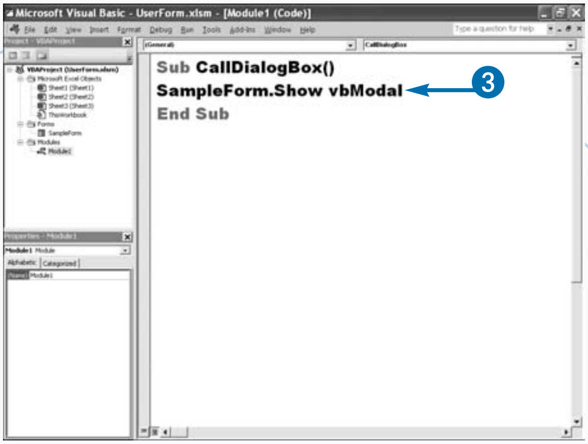
② Create a new Sub procedure.


Microsoft Visual Basic - UserForm.xlsm - [Module1 (Code)]
(General)
CallDialogBox
2

```
Sub CallDialogBox()

End Sub
```

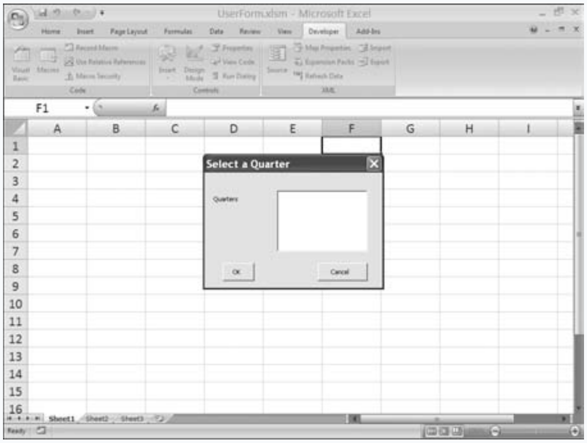
③ Create a Show command.

④ Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - UserForm.xlsm - [Module1 (Code)]
(General)
CallDialogBox
③

```
Sub CallDialogBox()
SampleForm.Show vbModal
End Sub
```

Excel displays the dialog box.


UserForm.xlsm - Microsoft Excel
Select a Quarter
Quarters
OK
Cancel

Extra

You can use the `Unload` statement to remove a UserForm from memory. When you call the statement, all controls on the UserForm are reset to their default values; as a result, you cannot access the options specified by the user after the UserForm unloads from memory. To maintain access to the necessary values, you can either store the values in global variables or hide the UserForm until your procedure terminates. To unload a UserForm, specify the `Unload` statement followed by the name of the UserForm that you want to unload, or use the following shorter code:

THIS CODE:	IS EQUIVALENT TO:
`Unload UserForm1`	`Unload Me`

You can hide a UserForm so that it is no longer visible. To hide a UserForm, use the `Hide` method. When you hide a UserForm, you can still access it from your procedure.

TYPE THIS:	RESULT:
`UserForm1.Hide`	Excel hides the form.

After hiding a form, Excel may appear to freeze as your code continues to access the UserForm. This condition clears as soon as the code that accesses the UserForm finishes processing.

Capture Input from a Custom Dialog Box

Dialog boxes in Excel gather input from the user. The input can be anything, from which button the user clicks to text the user types into a field. You can capture user input by using UserForm events. For example, when the user clicks an OK CommandButton control, you can use a CommandButton_Click Sub procedure to tell Excel what to do next.

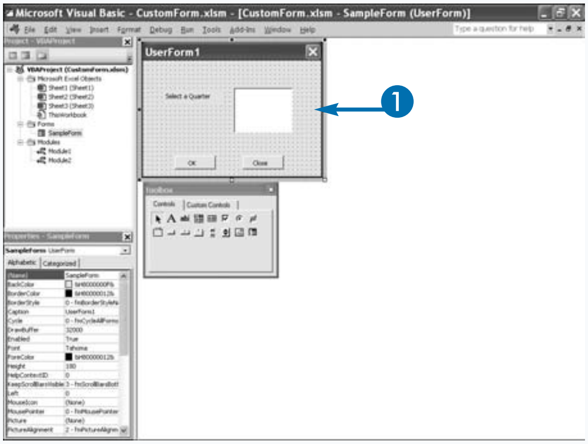
Excel considers every user interaction that occurs in a dialog box to be an event. For example, scrolling through a list of items, clicking an OK button, and typing text in a text box are all events. Each UserForm control has several events that you can capture. The most common event is the `Click` event, which occurs each time a user clicks a control. To make `UserForms` interactive, you can create procedures that execute when specific events occur.

Each `UserForm` has two views: a graphical layout window and a code window. The graphical layout window is where you add controls that display in the dialog box. See the section, "Create a Custom Dialog Box," for more information on designing custom dialog boxes. The code window contains the code associated with the UserForm. You can use the code window to create event procedures for each control. To create event code, you double-click the control. By default, the VBE creates a private click event for a control when you double-click it. If a Click event already exists, the VBE simply displays the code window. Users cannot execute private click event procedures by using the Macro dialog box. The only way execute a private click event procedure is to click the appropriate control.

Capture Input from a Custom Dialog Box

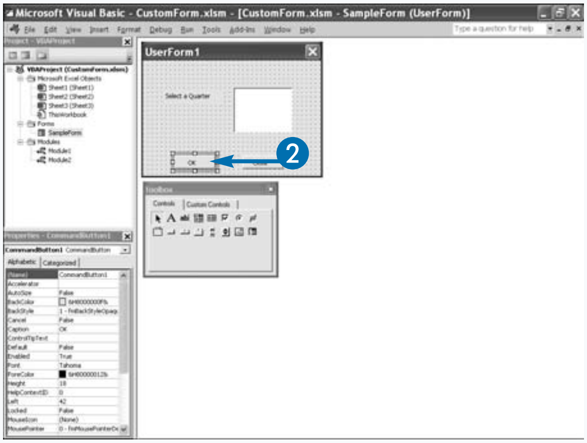
① Create a UserForm.

Note: *See the section, "Create a Custom Dialog Box," for information on creating UserForms.*

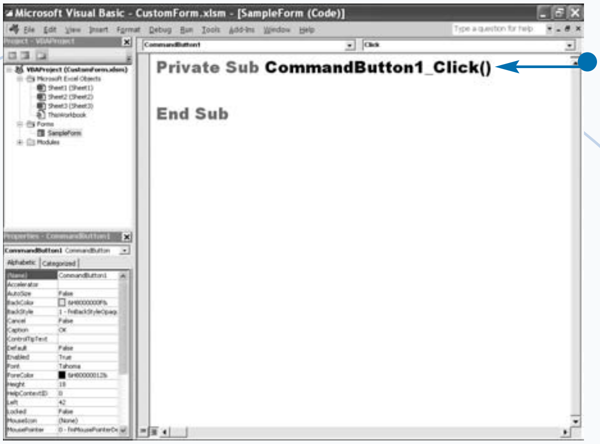

Microsoft Visual Basic - CustomForm.xlsm - [CustomForm.xlsm - SampleForm (UserForm)]
UserForm1
Select a Quarter
OK
Close
Toolbox
1

② Double-click a Command button.

In this example, you write code for the OK button, and so you double-click OK.


Microsoft Visual Basic - CustomForm.xlsm - [CustomForm.xlsm - SampleForm (UserForm)]
UserForm1
Select a Quarter
OK
Toolbox
2

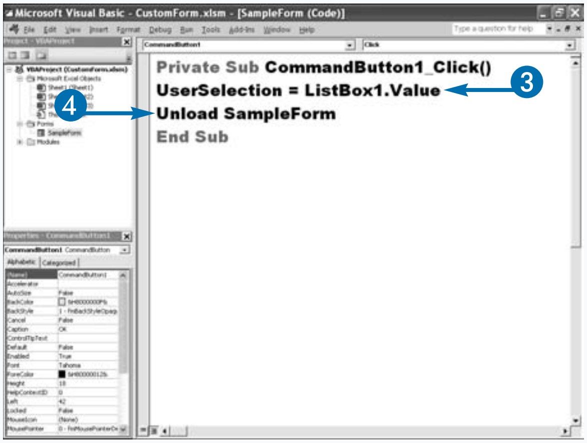
- VBA creates a Sub procedure.


Microsoft Visual Basic - CustomForm.xlsm - [SampleForm (Code)]
CommandButton1
Click

```
Private Sub CommandButton1_Click()

End Sub
```

③ Assign the user selection to a variable.

④ Close the dialog box.


Microsoft Visual Basic - CustomForm.xlsm - [SampleForm (Code)]
CommandButton1
Click
4
3

```
Private Sub CommandButton1_Click()
UserSelection = ListBox1.Value
Unload SampleForm
End Sub
```

Extra

A Click event occurs when the user clicks a control or a value in a control. For most controls, you can write a procedure to handle the Click event by simply placing _Click after the control name.

Example:

```
Sub CommandButton1_Click()
```

A Click event also occurs when the user presses Enter while a control has focus, when the user presses the accelerator key that corresponds to the control, or when the user presses the Spacebar while a CommandButton has focus.

If you need to capture the Click event to determine the page or tab selected with a MultiPage or TabStrip control, the procedure also includes an index parameter value that specifies the index to the page or tab.

Example:

```
Sub MultiPage1_Click(1)
```

With the MultiPage and TabStrip controls, create a separate procedure to handle the selection of each page or tab by using the corresponding index value.

continued →

Capture Input from a Custom Dialog Box (continued)

You can create code to monitor events and determine when specific code should execute. Each control has its own events, and the VBE lists them for you in the procedure list box. You can quickly create an event procedure in the code window by selecting the appropriate control name in the Object list box and then selecting the corresponding event from the Procedure list box. When you select an event, the VBE creates a procedure with the name of the control followed by the event name.

The dialog box displays and returns. Control values on a UserForm are only active as long as the dialog box is open. If you close the dialog box prior to saving user input values, you lose the user input. To avoid potential problems relating to lost data, consider saving user responses to global variables that can pass into other procedures. For example, you can call a UserForm from another procedure to capture user responses and then pass the values back to the main procedure.

You declare public variables at the top of your module, before any procedure code, by using the Public statement. Declaring public variables enables you to declare variables that all procedures in a project can access. See Chapter 3 for more information on declaring variables.

When working with a single-column list box or combo box, you can use the `AddItem` method to create the list of choices that appears in the box. The following is the syntax for the `AddItem` method:

```
object.AddItem Item
```

You can use the `With` statement to shorten the code required to create the list. See Chapter 4 for more information on using the `With` statement.

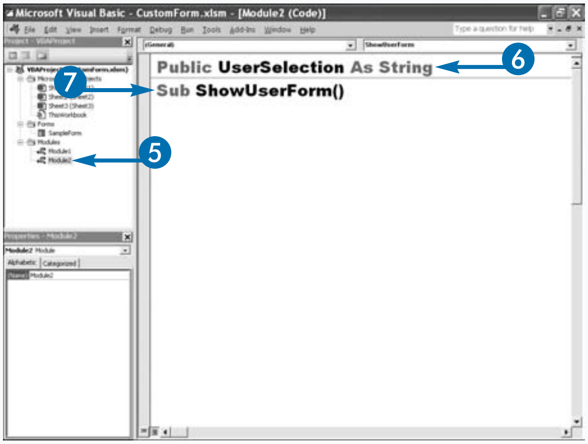
Capture Input from a Custom Dialog Box *(continued)*

5 Create a new module.

Note: *See Chapter 2 to learn how to create a new module.*

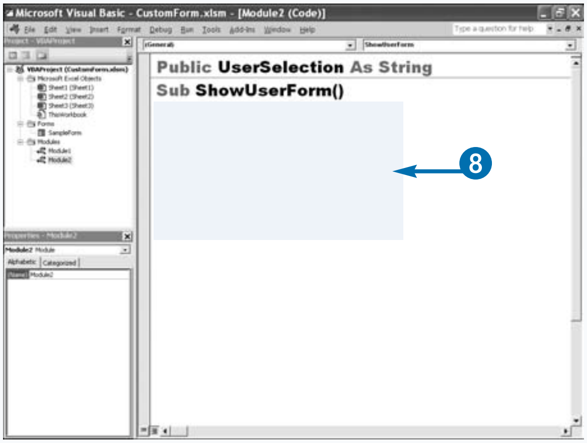
6 Declare a public variable to hold the user selection.

7 Create a Sub procedure.



```
Public UserSelection As String
Sub ShowUserForm()
```

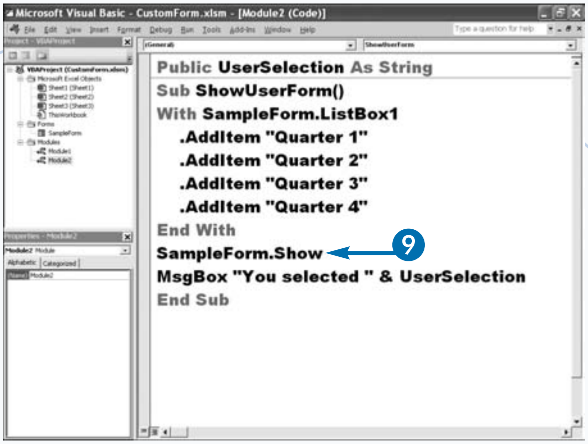
8 Add items to the list box.



```
Public UserSelection As String
Sub ShowUserForm()
```

⑨ Show the dialog box.

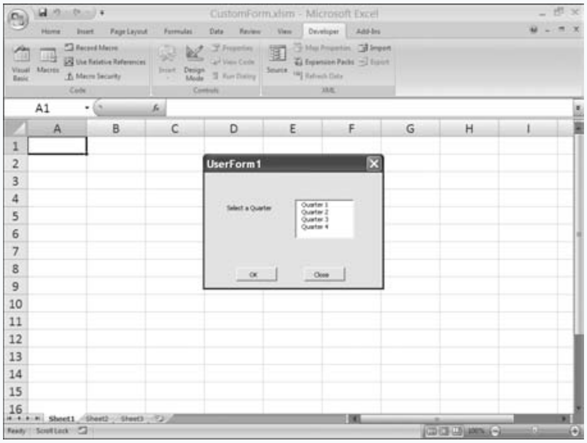
⑩ Press Alt+F11 to switch from the VBE to Excel, and run the macro.



```
Public UserSelection As String
Sub ShowUserForm()
With SampleForm.ListBox1
    .AddItem "Quarter 1"
    .AddItem "Quarter 2"
    .AddItem "Quarter 3"
    .AddItem "Quarter 4"
End With
SampleForm.Show
MsgBox "You selected " & UserSelection
End Sub
```

Microsoft Visual Basic - CustomForm.xlsm - [Module2 (Code)]
9

The dialog box displays and then a message box returns.



CustomForm.xlsm - Microsoft Excel
UserForm1
Select a Quarter
Quarter 1
Quarter 2
Quarter 3
Quarter 4
OK
Close

Apply It

You use control events to determine when to execute specific code. The following list identifies the most common events that occur with the various controls placed on UserForms. Not all events are available for each control. In the code window, check the Procedure list box to see the events that are associated with the selected control.

CONTROL EVENT	OCCURRENCE
BeforeDragOver	The user is dragging-and-dropping data onto a control.
BeforeUpdate	Before data on a control is changed.
Change	The `Value` property of the control changes.
Click	The user clicks the control.
DblClick	The user clicks the control twice.
Enter	Before a control receives focus.
KeyDown	The user presses a key.
MouseDown	The user presses the left mouse button.

Validate Input from a Dialog Box

You can validate the values returned by controls in a dialog box before passing them to your procedure. You validate the data values for two reasons: First to ensure the user specifies a value for a control. Second, and probably more important, to ensure errors do not occur in your code as a result of wrong data passing to a procedure.

You can create code that validates the user input for any event that occurs in a UserForm. The best time to validate is prior to closing the dialog box. For example, if a CommandButton control, such as an OK button, passes values to variables and closes the dialog box, the OK button is the ideal place to validate your data. When you create the validation code, you can use a conditional statement, such as an `If Then` statement, to check the properties of each control. For example, to make sure the user typed a string in the Name text field of a dialog box, you can add the following `If Then` statement to your procedure: `If TextBox1.Text = " " Then`.

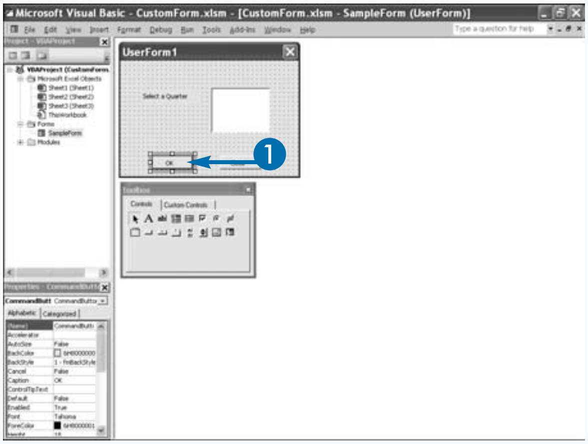
The `If Then` statement checks the `Text` property for the specified TextBox control to ensure that it contains a value. If the TextBox control does not contain a value, your VBA code can call the MsgBox function and display a message telling the user that a value must be entered.

In addition to checking for values, you can also use the VBA validation functions to verify that the control contains the appropriate data type. For example, you can use the statement `If Not IsNumeric(TextBox1.Value) Then` to ensure that the user typed a number in a TextBox control.

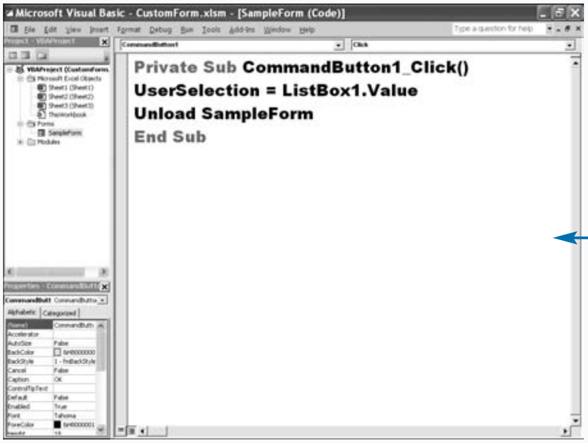
When working with a list box, you can use the `ListIndex` property to find out if the user typed in a value. The `ListIndex` property returns –1 if the user did not type in a value, 0 if the user selected the first value in the list, 1 if the user selected the second value in the list, and so on.

Validate Input from a Dialog Box

1. Double-click the control to which you want to add validation.


Microsoft Visual Basic - CustomForm.xlsm - [CustomForm.xlsm - SampleForm (UserForm)]
UserForm1
Select a Quarter
OK
1

- The code window opens.

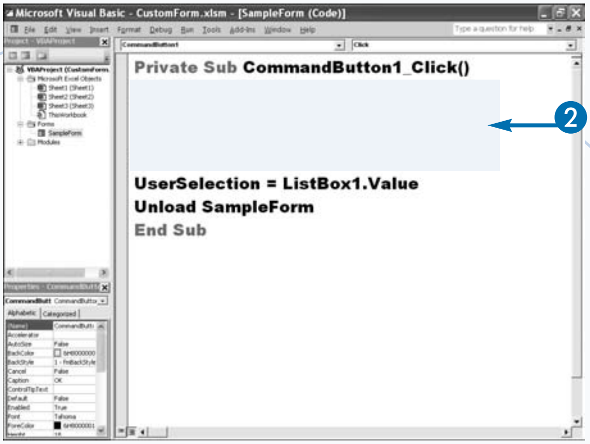

Microsoft Visual Basic - CustomForm.xlsm - [SampleForm (Code)]
CommandButton1
Click

```
Private Sub CommandButton1_Click()
UserSelection = ListBox1.Value
Unload SampleForm
End Sub
```

② Add the validation code.

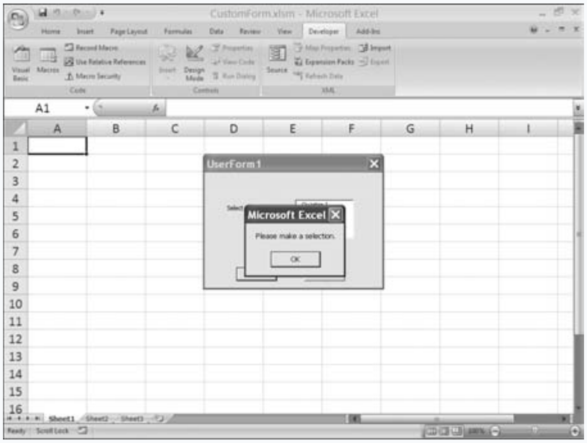
In this example, if the user does not make a selection, a message box appears.

③ Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - CustomForm.xlsm - [SampleForm (Code)]
CommandButton1
Click
2

```
Private Sub CommandButton1_Click()

UserSelection = ListBox1.Value
Unload SampleForm
End Sub
```

If you do not make a selection, a message box appears.



Please make a selection.

Extra

You can use the UserForm events to launch validation code, as shown in the following example. The code captures the `QueryClose` event to ensure that the user selected a ListBox control prior to the dialog box closing. A `QueryClose` event occurs before a UserForm closes.

Example:

```
Private Sub
UserForm_QueryClose(Cancel As
Integer, CloseMode As Integer)
If Not IsNumeric(TextBox1.Value)
Then
      MsgBox "Must be a number"
      Cancel = 1
 End If
```

The `QueryClose` event has two arguments, `Cancel` and `CloseMode`. The `Cancel` argument accepts an integer value. If the value of the argument is anything other than zero, the `QueryClose` event stops and the associated dialog box remains open. The `CloseMode` argument contains a constant value indicating the cause of the `QueryClose` event, as shown in the following table.

CONSTANT	VALUE	DESCRIPTION
vbFormControlMenu	0	The user selected the Close button in the dialog box.
vbFormCode	1	The code initiated an Unload statement.
vbAppWindows	2	The Windows operating session is ending.
vbAppTaskManager	3	The Windows Task Manager is closing Excel.

Create Custom UserForm Controls

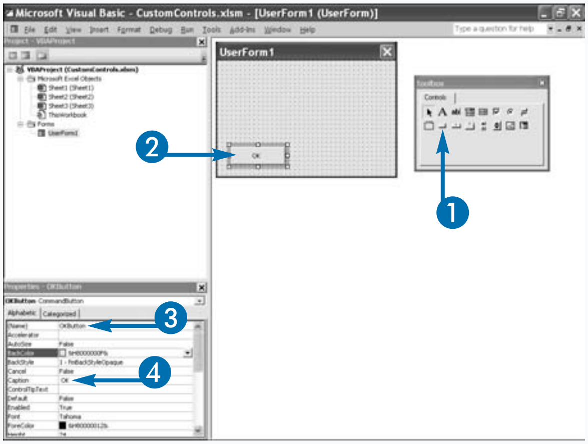
You can customize the Toolbox to suit your needs. The Toolbox that displays when you select a UserForm in the Visual Basic Editor contains all of the standard controls you can add to a UserForm. These controls display on a single tabbed page called Controls. By using the Properties window, you can change the tip text that displays when a user drags across the icon, the color of the control and many other features. You can also create new controls and add them to the Toolbox.

To create new controls, you customize and combine the existing controls. For example, if you add an OK button to all of your UserForms, you can create a custom button and set the appropriate properties, such as Caption, Width, Height, and Default. If you place the button in the Toolbox, the VBE adds it as a new control. Alternatively, you can create new controls by combining multiple controls. For example, you can create a new control that consists of an OK and a Cancel button.

To keep your custom controls separate from the existing controls in the Toolbox, you can add a new page to the Toolbox. You create a new page in the Toolbox by using the New Page option. You can assign a name to the new page by using the Rename option.

When you create a custom control by dragging a control from a form to the Toolbox, you only transfer the properties. Code that you have added to the control does not transfer. Each time you use a custom control you must add the necessary code.

Create Custom UserForm Controls

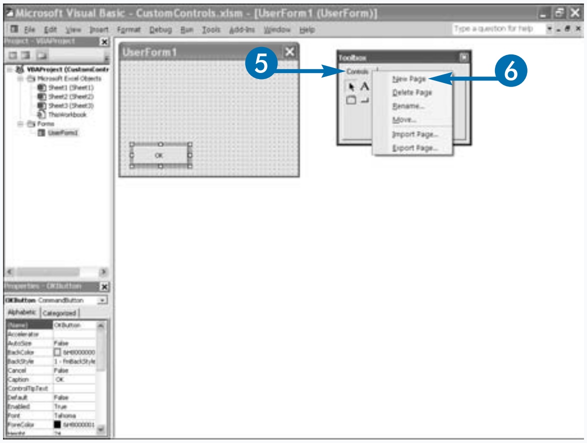

Microsoft Visual Basic - CustomControls.xlsm - [UserForm1 (UserForm)]
UserForm1
Toolbox
Controls
OK
Properties - OKButton
1
2
3
4

① In the Toolbox, click the control you want to customize.

② Drag the control to the UserForm.

③ In the Properties window, type the control name in the Name field.

④ Type the text you want to appear on the control in the Caption field.

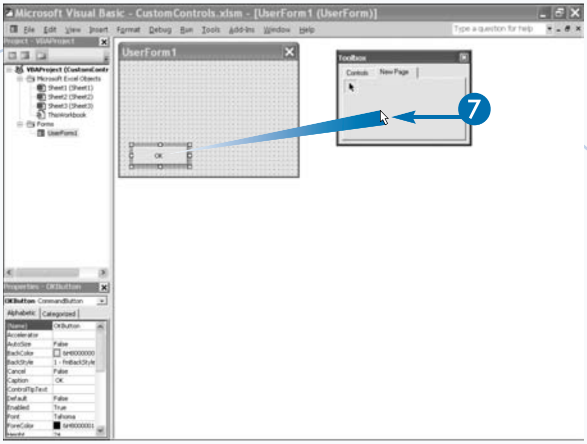

Microsoft Visual Basic - CustomControls.xlsm - [UserForm1 (UserForm)]
UserForm1
Toolbox
Controls
New Page
Delete Page
Rename...
Move...
Import Page...
Export Page...
OK
5
6

⑤ In the Toolbox, right-click the Controls tab.

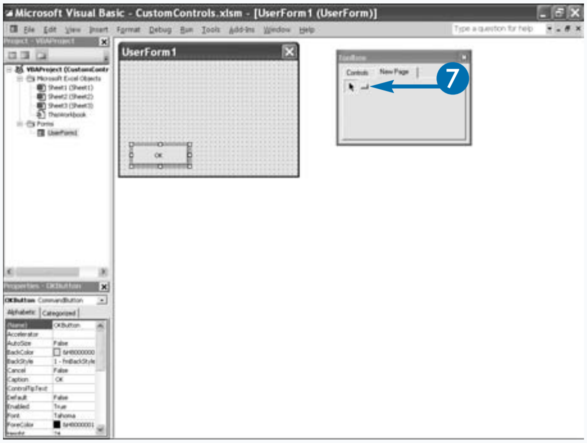
⑥ Click New Page.

The VBE adds a new page to the Toolbox.

7 Click the control on the UserForm and drag the control to the Toolbox.


Microsoft Visual Basic - CustomControls.xlsm - [UserForm1 (UserForm)]
UserForm1
Toolbox
Controls
New Page
OK
7

The control appears on the new page of the Toolbox.


Microsoft Visual Basic - CustomControls.xlsm - [UserForm1 (UserForm)]
UserForm1
Toolbox
Controls
New Page
OK
7

Extra

You can add multiple pages to the Toolbox. To change the order of the pages, right-click the page tab and then click the Move option on the menu to display the Move dialog box. Click the desired page to select it, and then click the Move Up or Move Down buttons to reorder your pages.

If you want to rename a tab, right-click the tab, and then click Rename. The Rename dialog box appears. Type the name you want to give the tab in the Caption field.

Creating a separate page in the Toolbox to store your custom controls gives you the ability to export the page for loading on another computer. To export a page, right-click the page tab and then click the Export Page option. In the Export Page dialog box, specify the name and location for the page file. The VBE assigns the page file an extension of .pag.

To import a page file into the Toolbox, right-click a tab menu and then click the Import Page option. In the Import Page dialog box, specify the name and location of the page file to import.

Create a UserForm Template

If you find that you create the same basic UserForm repeatedly, you can create a UserForm template file to save you time and effort. When you create UserForms, the Visual Basic Editor attaches them to the project in which you create them. Each time you create a new project, you must re-create the UserForm or copy it from another project by using the Project Explorer window. See Chapter 2 for more information on working with the Project Explorer window.

When you create a UserForm template, you design a basic UserForm and save it to a file. You can then add the UserForm to any other project you create. You can save a UserForm to a file by using the Export File command on the File menu. In the Export File dialog box, you specify the name and location for saving the UserForm file. You may want to create a folder in which to save Excel project files.

When you create a UserForm for use as a template, you should keep it generic so you can customize it for each new project. For example, if you frequently create a UserForm that contains a TextBox control for gathering user input, as well as two CommandButton controls, OK and Cancel, you can create a generic version with the three controls. However, if you do not place the Label control for the text box in the template version, you can import the form and customize it for the type of data you want to gather from the user.

To add a UserForm template to a project, you can use the Import option. The VBE creates a new UserForm and assigns it the next sequential name.

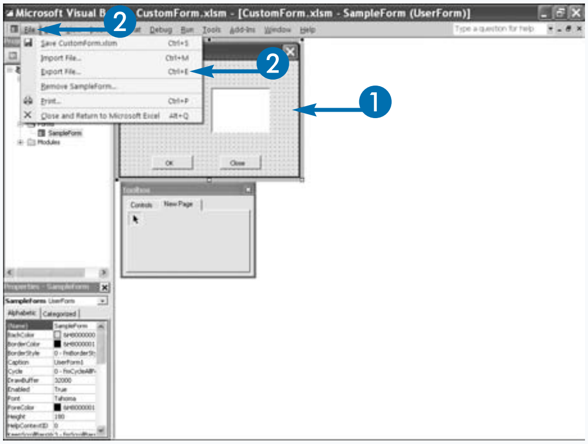
Create a UserForm Template

CREATE A TEMPLATE

① Create a UserForm.

Note: *See the section, "Create a Custom Dialog Box," for information on how to create a UserForm.*

② Click File ➔ Export File.

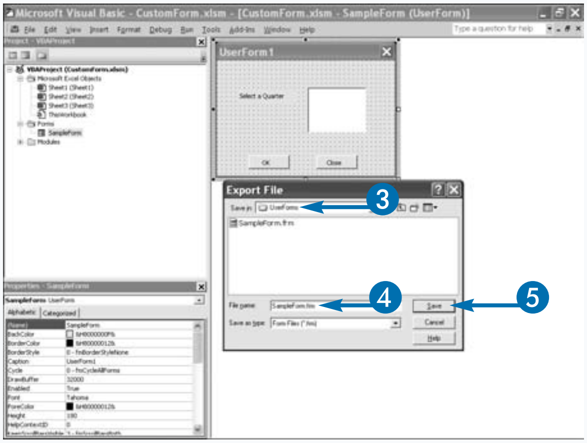

Microsoft Visual B CustomForm.xlsm - [CustomForm.xlsm - SampleForm (UserForm)]
File Debug Run Tools Add-Ins Window Help
Type a question for help
Save CustomForm.xlsm Ctrl+S
Import File... Ctrl+M
Export File... Ctrl+E
Remove SampleForm...
Print... Ctrl+P
Close and Return to Microsoft Excel Alt+Q
SampleForm
Modules
OK
Close
Toolbox
Controls
New Page
2
2
1

③ Locate the folder in which you want to save the file.

④ Type the filename.

⑤ Click Save.

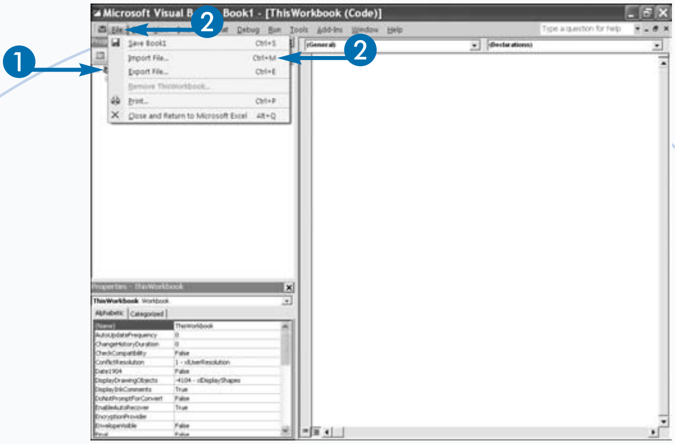
VBA exports the file.


Microsoft Visual Basic - CustomForm.xlsm - [CustomForm.xlsm - SampleForm (UserForm)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Project - VBAProject
VBAProject (CustomForm.xlsm)
Microsoft Excel Objects
Sheet1 (Sheet1)
Sheet2 (Sheet2)
Sheet3 (Sheet3)
ThisWorkbook
Forms
SampleForm
Modules
UserForm1
Select a Quarter
OK
Close
Export File
Save in: UserForms
SampleForm.frm
File name: SampleForm.frm
Save as type: Form Files (*.frm)
Save
Cancel
Help
3
4
5

IMPORT A TEMPLATE

① Click the project to which you want to add a UserForm.

② Click File ➔ Import File.


Microsoft Visual Basic - Book1 - [ThisWorkbook (Code)]
File
Debug
Run
Tools
Add-Ins
Window
Help
Type a question for help
Save Book1 Ctrl+S
Import File... Ctrl+M
Export File... Ctrl+E
Remove ThisWorkbook...
Print... Ctrl+P
Close and Return to Microsoft Excel Alt+Q
(General)
(Declarations)
1
2
2

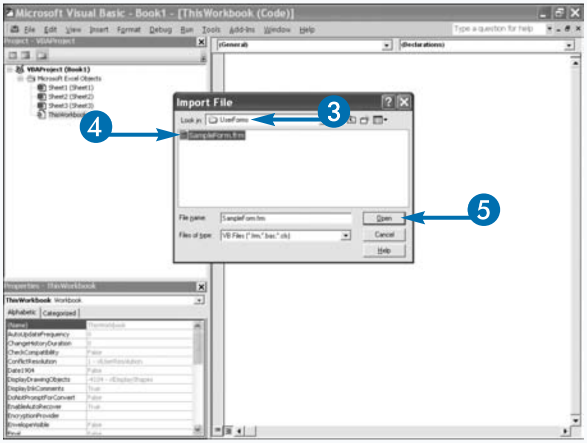
The Import File dialog box appears.

③ Locate the folder in which you saved the form.

④ Click the file containing the UserForm.

⑤ Click Open.

The VBE adds the UserForm to the project.


Microsoft Visual Basic - Book1 - [ThisWorkbook (Code)]
VBAProject (Book1)
Microsoft Excel Objects
Sheet1 (Sheet1)
Sheet2 (Sheet2)
Sheet3 (Sheet3)
ThisWorkbook
Import File
Open
Cancel
Help
3
4
5

Look in: UserForms

SampleForm.frm

File name: SampleForm.frm

Files of type: VB Files (*.frm;*.bas;*.cls)

Extra

You can specify the order that Excel uses to move between controls on the UserForm by setting the controls' tab order. Tab order is the order in which the VBE selects the control to move to when a user presses the Tab key. By default, the tab order is the order in which you add controls to a UserForm.

Each control has two properties that relate to tab order. You can use the Properties window to set these properties. The first property, `TabStop`, determines whether focus stops on the control when the user presses the Tab key. If you set the `TabStop` property for a control to False, then when the user tabs through the controls, Excel skips the control. The second property, `TabIndex`, is a value between zero and the number of controls, it sets the order in which Excel moves from control to control when the user presses the Tab key. You can use the Tab Order dialog box to set the tab order. This dialog box appears when you right-click the UserForm and then click Tab Order.

Create a CustomUI.xml File

With Office 2007, Microsoft introduced a new user interface for Excel. Earlier versions used toolbars and menus to provide access to Excel commands. Office 2007 uses the Ribbon. Using XML, you can customize the Excel Ribbon. Microsoft refers to the markup system you use as RibbonX. You create and use a file named customUI.xml to modify the Ribbon. Because you write XML in plain text, you can use any text editor to create a customUI.xml file.

Creating a basic Ribbon modification requires that you use control markups. The `ribbon` control markup represents the Ribbon.

The `tab` control markups represent the tabs on the Ribbon. All `tab` markups are contained within the `tabs` control markup. The tabs control markup does not have any attributes. You can set an `id` attribute and a `label` attribute for a `tab` control. You define `id` attributes. They uniquely identify controls. `Label` attributes assign a label to a control. You can assign many attributes to elements.

The `group` control markup identifies a group on a tab. You can set an `id` attribute and a `label` attribute with the `group` markup.

The `button` control markup creates a button on a tab. You can set `id`, `label`, `imageMso`, `size`, `onAction`, and `screenTip` attributes for a button control. The `imageMso` attribute identifies the built-in image you want to use as the button. The `size` attribute determines the size of the button. You can set the `size` attribute to either normal or large. The customUI.xml file can call the `onAction` attribute when the user clicks a control. The `screenTip` attribute specifies the screen tip that displays when the user rolls the mouse pointer over the button.

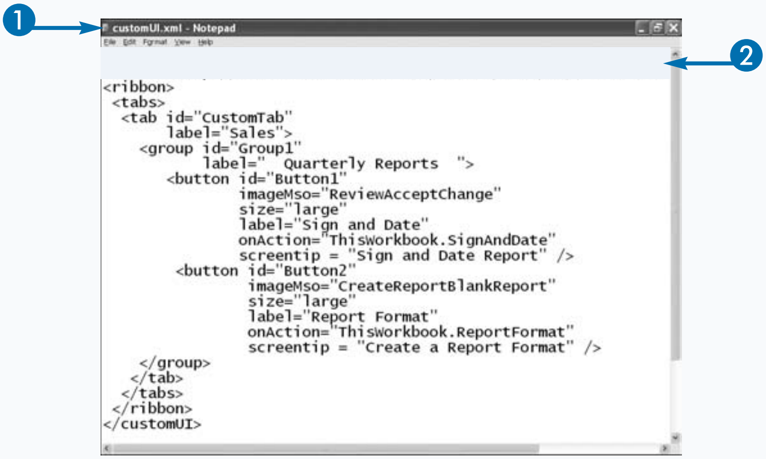
Create a CustomUI.xml File

① Create a file named customUI.xml.

You can use Notepad or another text editor to create the file.

② Type **<customUI xmlns=”http://schemas.microsoft.com/office/2006/01/customui”>**.

You start every customUI.xml file with this code.

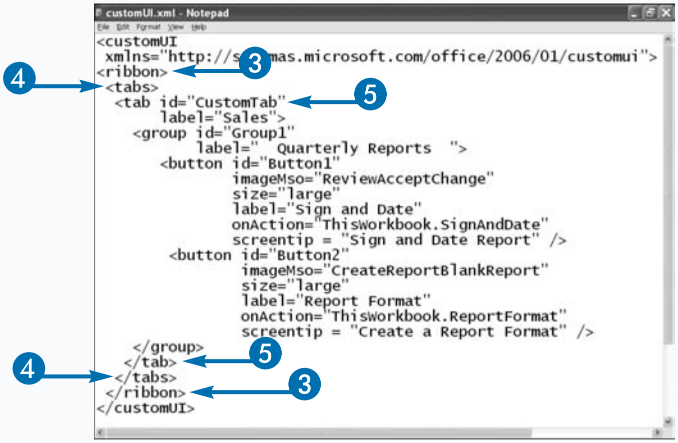


```
<ribbon>
 <tabs>
  <tab id="CustomTab"
       label="Sales">
    <group id="Group1"
           label="  Quarterly Reports  ">
       <button id="Button1"
               imageMso="ReviewAcceptChange"
               size="large"
               label="Sign and Date"
               onAction="ThisWorkbook.SignAndDate"
               screentip = "Sign and Date Report" />
        <button id="Button2"
                imageMso="CreateReportBlankReport"
                size="large"
                label="Report Format"
                onAction="ThisWorkbook.ReportFormat"
                screentip = "Create a Report Format" />
    </group>
   </tab>
  </tabs>
 </ribbon>
</customUI>
```

③ Create a ribbon markup control.

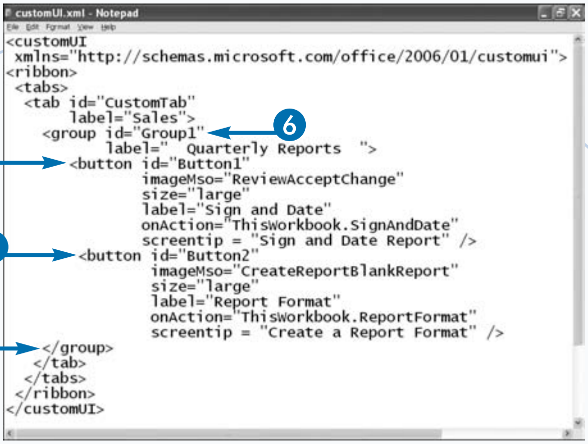
④ Create a tabs markup control.

⑤ Create a tab markup control.



```
<customUI
 xmlns="http://s   mas.microsoft.com/office/2006/01/customui">
<ribbon>
 <tabs>
  <tab id="CustomTab"
       label="Sales">
    <group id="Group1"
           label="  Quarterly Reports  ">
       <button id="Button1"
               imageMso="ReviewAcceptChange"
               size="large"
               label="Sign and Date"
               onAction="ThisWorkbook.SignAndDate"
               screentip = "Sign and Date Report" />
        <button id="Button2"
                imageMso="CreateReportBlankReport"
                size="large"
                label="Report Format"
                onAction="ThisWorkbook.ReportFormat"
                screentip = "Create a Report Format" />
    </group>
   </tab>
  </tabs>
 </ribbon>
</customUI>
```

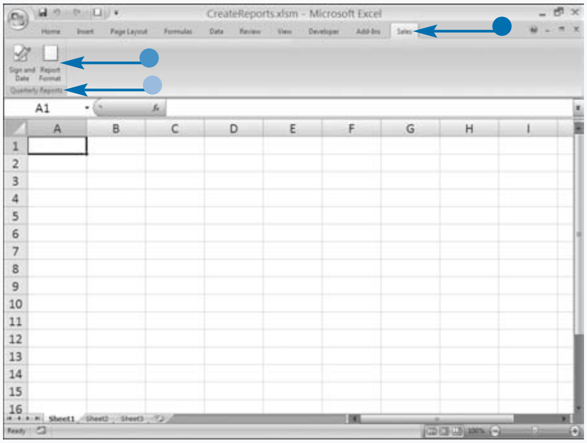
6. Create a group.
7. Create buttons.
8. Save your file with the filename customUI.xml.


customUI.xml - Notepad
File Edit Format View Help
6
7
7
6

```
<customUI
 xmlns="http://schemas.microsoft.com/office/2006/01/customui">
<ribbon>
 <tabs>
  <tab id="CustomTab"
       label="Sales">
    <group id="Group1"
           label="  Quarterly Reports  ">
     <button id="Button1"
             imageMso="ReviewAcceptChange"
             size="large"
             label="Sign and Date"
             onAction="ThisWorkbook.SignAndDate"
             screentip = "Sign and Date Report" />
      <button id="Button2"
              imageMso="CreateReportBlankReport"
              size="large"
              label="Report Format"
              onAction="ThisWorkbook.ReportFormat"
              screentip = "Create a Report Format" />
    </group>
   </tab>
  </tabs>
 </ribbon>
</customUI>
```

After you add your file to a workbook, your Ribbon should look like the one shown here.

- XML adds a new tab.
- Two buttons.
- A group.


CreateReports.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Sales
Sign and Date
Report Format
Quarterly Reports
A1
A
B
C
D
E
F
G
H
I
Sheet1
Sheet2
Sheet3
Ready

Extra

You use the `imageMso` attributes to identify the built-in image you want to appear on the Ribbon by using the following syntax:

```
imageMso = "ImageName"
```

To obtain the name of the image, click the Office button and then click Excel Options. The Excel Options dialog box appears. Click Customize. In the Choose Commands From field, select All commands. Move the mouse pointer over the command with the button that you want to use. A screen tip appears. The name of the image appears at the end of the screen tip in parentheses.

You can also download 2007OfficeIconsGallery from the Microsoft Web site. The 2007OfficeIconsGallery is an Excel workbook. When you open the workbook, galleries containing built-in images appear on the Developer tab. When you place your mouse pointer over an image or click an image, the name of the image appears. You can specify the size if the image by using the `size` attribute. Set the `size` attribute to `large` to display a large button. Set the `size` attribute to `normal` to display a normal size button.

Customize the Ribbon

To seamlessly integrate the procedures that you create with the Microsoft Excel user interface, you can place buttons on the Ribbon that will execute your macro when the user clicks the button. You modify the Excel Ribbon by placing a customUI.xml file in your workbook file, and then creating a relationship between the workbook and the customization file. See the section, "Create a CustomUI.xml File," to learn more about creating a customization file.

You can open an Excel workbook file by changing the filename extension to .zip and then double-clicking the file. When the file opens, you will see several files and folders. You refer to this ZIP file as a package, and the files in the ZIP file as parts. To modify the Ribbon, you place your customUI.xml file in a folder named customUI and then place the folder and file in the package.

Relationships define how the parts of a document come together to form the document. Relationships are stored in the /_rels folders in .rels files in the root and in subdirectories of the file. To modify the Ribbon, you must create a relationship between the workbook and the customization file by adding a relationship to the .rels file under _rels in the root directory. You create the relationship by placing the following code between the last Relationship tag and the Relationships tag.

```
<Relationship Id="someID" Type="http://
schemas.microsoft.com/office/2006/relations
hips/ui/extensibility" Target=customUI/
customUI.xml" />
```

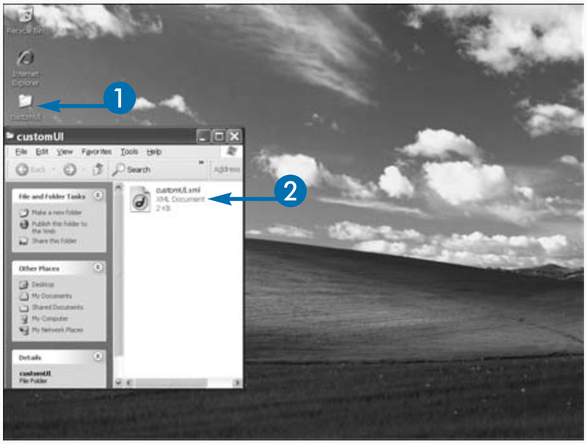
When your procedures are going to be executed through Ribbon buttons, you place your procedures in the ThisWorkbook module and place `ByVal control As IRibbonControl` between the parentheses if you are using an `onAction` attribute with a button, as follows:

```
Sub SubName (ByVal control As
IRibbonControl)
```

Customize the Ribbon

1. Create a folder on your desktop named customUI.
2. Place your customUI.xml file in the folder.

Note: *See the section, "Create a CustomUI.xml File," to learn how to create a custom UI file.*


customUI
File Edit View Favorites Tools Help
Back Search
File and Folder Tasks
Make a new folder
Publish this folder to the Web
Share this folder
Other Places
Desktop
My Documents
Shared Documents
My Computer
My Network Places
Details
customUI
File Folder
customUI.xml
XML Document
2 KB
1
2

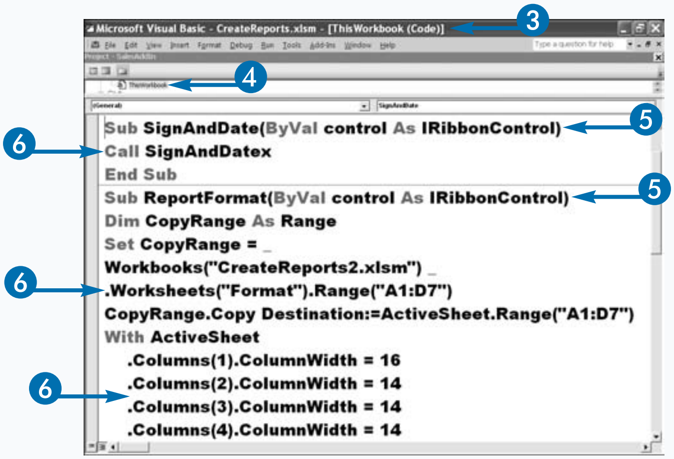
3. Open the file that will contain the macros you want to execute.
4. In the VBE, double-click ThisWorkbook.

   The workbook module opens.

5. Name your Sub procedure and place `ByVal control As IRibbonControl` in parentheses.

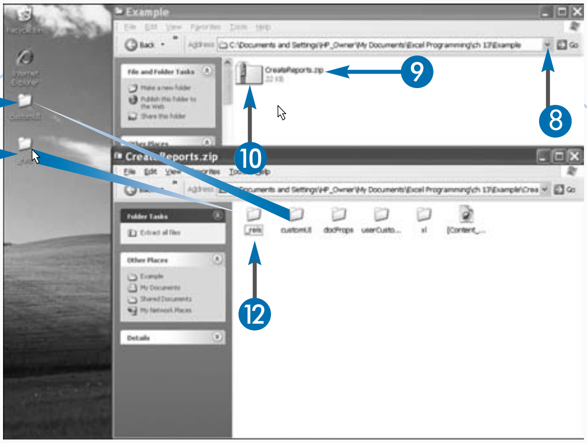
   You add this code because you are going to use an `onAction` attribute.

6. Type your procedure.
7. Save and close your file.


Microsoft Visual Basic - CreateReports.xlsm - [ThisWorkbook (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Type a question for help
ThisWorkbook
(General)
SignAndDate
3
4
5
5
6
6
6

```
Sub SignAndDate(ByVal control As IRibbonControl)
Call SignAndDatex
End Sub
Sub ReportFormat(ByVal control As IRibbonControl)
Dim CopyRange As Range
Set CopyRange = _
Workbooks("CreateReports2.xlsm") _
.Worksheets("Format").Range("A1:D7")
CopyRange.Copy Destination:=ActiveSheet.Range("A1:D7")
With ActiveSheet
   .Columns(1).ColumnWidth = 16
   .Columns(2).ColumnWidth = 14
   .Columns(3).ColumnWidth = 14
   .Columns(4).ColumnWidth = 14
```

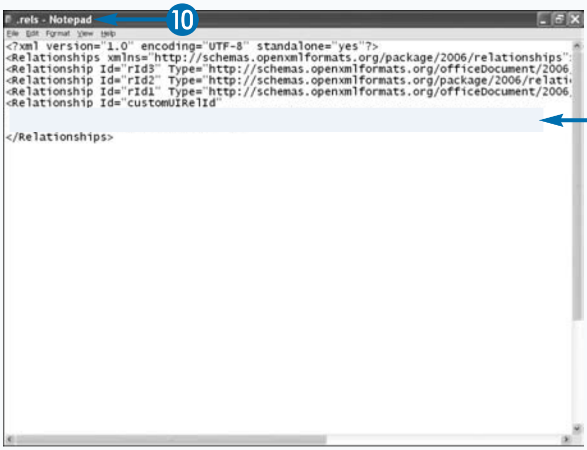
8. Locate your file in Windows Explorer.
9. Change the extension on the filename to .zip.
10. Double-click the file to open it.
11. Drag the customUI folder from the desktop to the ZIP file.
12. Drag the _rels folder from the ZIP file to the desktop.
13. Double-click the rels folder to open it.


Example
C:\Documents and Settings\HP_Owner\My Documents\Excel Programming\ch 17\Example
CreateReports.zip
CreateReports.zip
_rels
customUI
docProps
userCusto...
xl
[Content_...
8
9
10
11
12
13

The RELS file appears.

14. Open the RELS file in Notepad or another text editor.
15. Create a Relationship.
16. Save and close the file.
17. Delete the RELS file in the ZIP file and replace it with the new RELS file.
18. Rename the ZIP file back to its original name.

A new tab appears in the file.


.rels - Notepad
File Edit Format View Help
10
15

```
<?xml version="1.0" encoding="UTF-8" standalone="yes"?>
<Relationships xmlns="http://schemas.openxmlformats.org/package/2006/relationships"
<Relationship Id="rId3" Type="http://schemas.openxmlformats.org/officeDocument/2006
<Relationship Id="rId2" Type="http://schemas.openxmlformats.org/package/2006/relati
<Relationship Id="rId1" Type="http://schemas.openxmlformats.org/officeDocument/2006
<Relationship Id="customUIRelId"


</Relationships>
```

Extra

The procedure outlined in the steps modifies the Ribbon for an individual workbook. If you want to modify the Ribbon for multiple workbooks by using VBA, you can use an add-in. You create an add-in by saving a workbook in the add-in format. Add-ins enable you to integrate additional functionality into Microsoft Excel. You can create an add-in and distribute it to others. See Chapter 16 to learn more about add-ins.

If you are planning to convert a workbook with a modified Ribbon to an add-in, do not place your code in ThisWorkbook. Create your Sub procedures in ThisWorkbook as you normally would. Place your code in standard modules and then call the standard Sub procedure from the code in ThisWorkbook.

Example:

```
Sub SignAndDate(ByVal control As IRibbonControl)
Call SignAndDateX
End Sub
```

Add Additional Options to the Ribbon

You can create a customUI.xml file, and use that file to create a new Ribbon tab, add buttons to the tab, and use the buttons to execute your procedures. You can also add control markups to your customUI.xml file that will create launchers, combo boxes, toggle buttons, check boxes, and edit boxes.

When creating your XML code, you use callbacks to run procedures based on the information returned when the user interacts with a control. For example, check boxes return a Boolean value of either `True` or `False` when you use the `onAction` callback. Your procedure can perform one action if the value returned is `True`, and another action if the value returned is `False`.

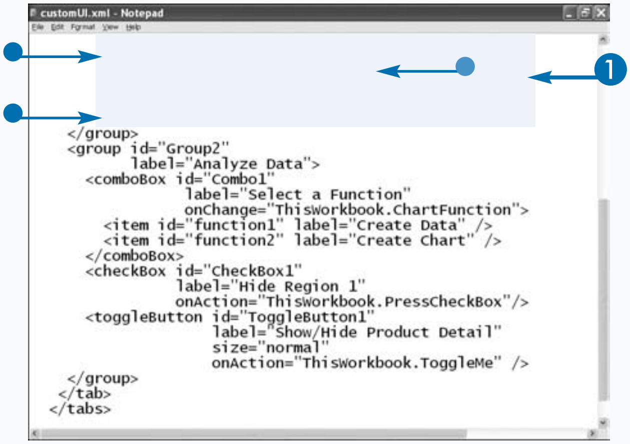
Excel uses dialog boxes to enable users to access advanced features. The user is able to open the dialog box by clicking a launcher located in the lower-right corner of the group. You can create launchers to open the dialog boxes you create for your custom applications. Dialog boxes are useful when you want to obtain information from the user. Use the `dialogBoxLauncher` element to create a launcher. Each group can have one launcher. The launcher element must be the last element in the group and must contain a button control. You can use the `onAction` callback with a dialog box to tell VBA what procedure to execute when the user clicks the launcher.

Use the `comboBox` element to present the user with a menu of options. When you present the user with a menu, the procedure that executes depends on the option the user selects. You typically use conditional statements with a combo box.

Add Additional Options to the Ribbon

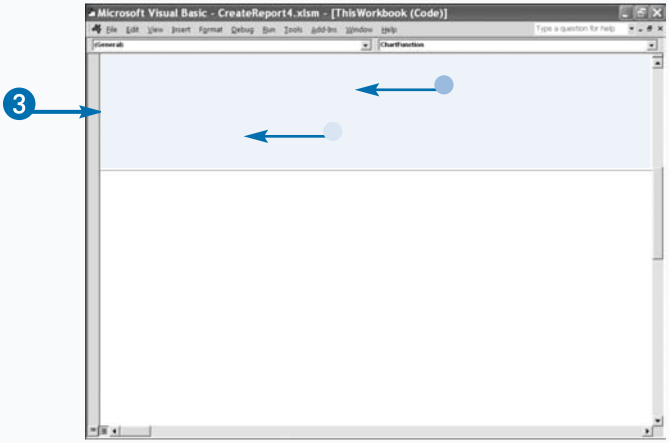
ADD A LAUNCHER

1. Add code to your customUI.xml file.
   - The dialogBoxLauncher tag.
   - The required button tag.


customUI.xml - Notepad
File Edit Format View Help
1

```
  </group>
  <group id="Group2"
         label="Analyze Data">
    <comboBox id="Combo1"
               label="Select a Function"
               onChange="ThisWorkbook.ChartFunction">
      <item id="function1" label="Create Data" />
      <item id="function2" label="Create Chart" />
    </comboBox>
    <checkBox id="CheckBox1"
              label="Hide Region 1"
              onAction="ThisWorkbook.PressCheckBox"/>
    <toggleButton id="ToggleButton1"
                  label="Show/Hide Product Detail"
                  size="normal"
                  onAction="ThisWorkbook.ToggleMe" />
  </group>
 </tab>
</tabs>
```

2. Open the VBE.
3. Add the code that will execute to ThisWorkbook.
   - Opens an input box.
   - Inserts a title in your worksheet.


Microsoft Visual Basic - CreateReport4.xlsm - [ThisWorkbook (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Type a question for help
(General)
ChartFunction
3

ADD A COMBO BOX

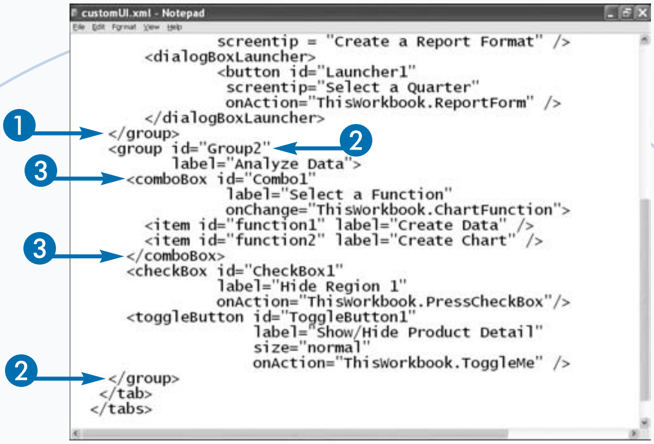
① Add a tag to end the previous group.

② Add tags for the new group.

This label will appear at bottom of the group.

③ Create your combo box tags.

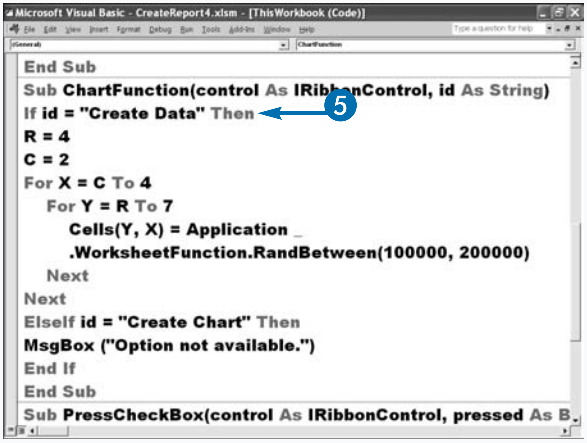
Ids can be anything you want, but they must be unique.


customUI.xml - Notepad
File Edit Format View Help
1
2
3
3
2

```
                screentip = "Create a Report Format" />
        <dialogBoxLauncher>
                <button id="Launcher1"
                 screentip="Select a Quarter"
                 onAction="ThisWorkbook.ReportForm" />
        </dialogBoxLauncher>
    </group>
    <group id="Group2"
           label="Analyze Data">
      <comboBox id="Combo1"
                 label="Select a Function"
                 onChange="ThisWorkbook.ChartFunction">
        <item id="function1" label="Create Data" />
        <item id="function2" label="Create Chart" />
      </comboBox>
      <checkBox id="CheckBox1"
                label="Hide Region 1"
                onAction="ThisWorkbook.PressCheckBox"/>
      <toggleButton id="ToggleButton1"
                    label="Show/Hide Product Detail"
                    size="normal"
                    onAction="ThisWorkbook.ToggleMe" />
    </group>
  </tab>
</tabs>
```

④ Open the VBE.

⑤ Add the code that will execute to ThisWorkbook.


Microsoft Visual Basic - CreateReport4.xlsm - [ThisWorkbook (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Type a question for help
(General)
ChartFunction
5

```
End Sub
Sub ChartFunction(control As IRibbonControl, id As String)
If id = "Create Data" Then
R = 4
C = 2
For X = C To 4
    For Y = R To 7
        Cells(Y, X) = Application _
        .WorksheetFunction.RandBetween(100000, 200000)
    Next
Next
ElseIf id = "Create Chart" Then
MsgBox ("Option not available.")
End If
End Sub
Sub PressCheckBox(control As IRibbonControl, pressed As B
```

Extra

Prior to Office 2007, developers used command bars to modify the user interface. In most cases, this code will work in Office 2007 without any modification. The changes appear on the Add-ins tab. If the developer added an item to a menu in Office 2003, then Office 2007 creates a Menu Commands group and places the information there. If the information was assigned to a toolbar, then Office 2007 places the information in a Toolbar Commands group.

You can use XML markup and any Microsoft .NET framework-base language to make modifications to the user interface.

A check box returns either the Boolean value `True` or the Boolean value `False`. You can use a checkbox to set a property to `True` or `False`. For example, you can use a check box to set the `Hidden` property for a worksheet column. If the Hidden property is `False` the column is visible. If the Hidden property is set to `True` the column is not visible.

continued →

Add Additional Options to the Ribbon (continued)

You can use the `toggleButton` element to add a toggle button to the Ribbon. Toggle buttons are useful when you want to enable the user to turn an option on and off with a single mouse click. For example, if you have a worksheet in your workbook that contains values on which you base calculations and those values seldom change, you may want to hide the worksheet. The example for this section has a Workbook_Open command that hides the worksheet from which VBA copies the report format that VBA places in the active worksheet when the user presses the Report Format button. You could add a toggle button to the Ribbon to show and hide this worksheet by using an `onAction` callback and adding the following code to ThisWorkbook:

```
Sub HideSheets(control As IRibbon, _
pressed As Boolean)
Sheets("Format").Visible = pressed
End Sub
```

When used with a toggle button, the `onAction` callback returns `True` when a toggle button is pressed, and `False` when it is not. The values are returned to the variable `pressed`. The code unhides the worksheet when the button is in a pressed state, and hides the worksheet when the button is in an unpressed state. Toggle buttons are always in one of two states, pressed or unpressed. In Excel, bold is an example of a toggle button.

You can use the checkBox element to add check boxes. For example, if your data consists of three columns with data for Region 1, Region 2, and Region 3, then you can create a check box that hides and unhides the information for each of the regions.

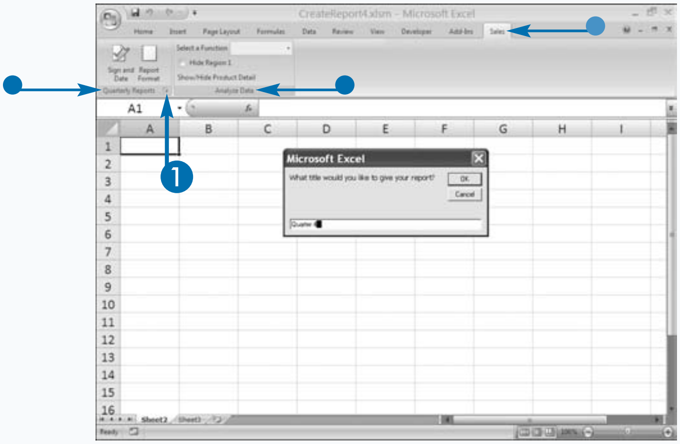
Add Additional Options to the Ribbon *(continued)*

VIEW CHANGES TO THE RIBBON

1. Click the launcher to open a dialog box.

   The dialog box appears.

   - Notice that there are two groups.
   - Notice the custom tab.


CreateReport4.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Sales
Sign and Date
Report Format
Quarterly Reports
Select a Function
Hide Region 1
Show/Hide Product Detail
Analyze Data
A1
1

Microsoft Excel

What title would you like to give your report?

OK

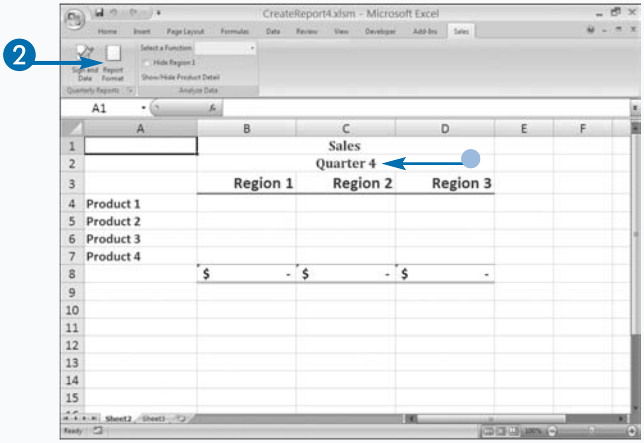
Cancel

Quarter 4

- The dialog box adds a title to your worksheet.

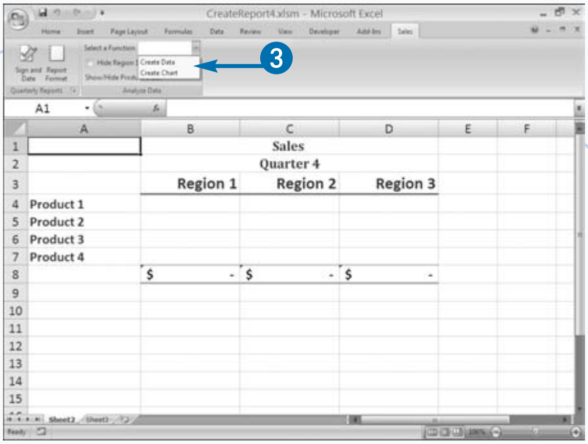
2. Click this button to add a format to your worksheet.

***Note:** To add this button, see the section, "Customize the Ribbon".*


CreateReport4.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Sales
Sign and Date
Report Format
Quarterly Reports
Select a Function
Hide Region 1
Show/Hide Product Detail
Analyze Data
A1
2

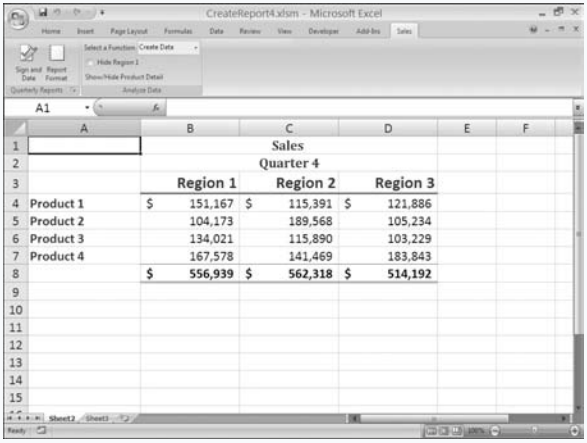
	A	B	C	D
1			Sales	
2			Quarter 4	
3		Region 1	Region 2	Region 3
4	Product 1			
5	Product 2			
6	Product 3			
7	Product 4			
8		$ -	$ -	$ -

③ Click the combo box to see a list of options.


CreateReport4.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Sales
Sign and Date
Report Format
Quarterly Reports
Select a Function
Hide Region 1
Show/Hide Product Detail
Create Data
Create Chart
Analyze Data
A1
3
Sheet2
Sheet3
Ready

	A	B	C	D	E	F
1			Sales			
2			Quarter 4			
3		Region 1	Region 2	Region 3		
4	Product 1					
5	Product 2					
6	Product 3					
7	Product 4					
8		$ -	$ -	$ -		

The Create Data option fills your worksheet with numbers.


CreateReport4.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Sales
Sign and Date
Report Format
Quarterly Reports
Select a Function
Create Data
Hide Region 1
Show/Hide Product Detail
Analyze Data
A1
Sheet2
Sheet3
Ready

	A	B	C	D	E	F
1			Sales			
2			Quarter 4			
3		Region 1	Region 2	Region 3		
4	Product 1	$ 151,167	$ 115,391	$ 121,886		
5	Product 2	104,173	189,568	105,234		
6	Product 3	134,021	115,890	103,229		
7	Product 4	167,578	141,469	183,843		
8		$ 556,939	$ 562,318	$ 514,192		

Extra

The following XML script creates a check box and a toggle button.

```
<checkBox id="CheckBox1" label="Hide Region 1" onAction="ThisWorkbook.PressCheckBox"/>
<toggleButton id="ToggleButton1" label="Show/Hide Product Detail" size="normal"
onAction="ThisWorkbook.ToggleMe"/>
```

The following code hides or unhides a column when the user clicks the check box. When the user checks the check box the Boolean value `True` is returned to the variable `pressed`; when the user unchecks the checkbox the Boolean value `False` is returned to the variable `pressed`.

```
Sub PressCheckBox(control As IRibbonControl, pressed as Boolean)
Columns(2).Hidden = pressed
End Sub
```

The following code hides or unhides rows four through seven when a toggle button is pressed.

```
Sub ToggleMe(control As IRibbonControl, pressed As Boolean)
R = 4
For X = R to 7
      Rows(X).Hidden = pressed
Next
End Sub
```

Create a Chart Sheet

You can use VBA to add a new chart sheet to your workbook. When you create a chart, VBA creates a new `Chart` object. Each `Chart` object contains several objects that represent the settings for the chart. For example, the `ChartTitle` object contains the chart title, its `font` and `border` properties, and other associated attributes.

When you create a chart, you can create a new chart sheet or embed a chart in a worksheet. When creating a new chart sheet, you use the `Chart` object directly, whereas when you create an embedded chart, you use a `ChartObjects` object. See the section, "Embed a Chart in a Worksheet," for more information on creating embedded charts.

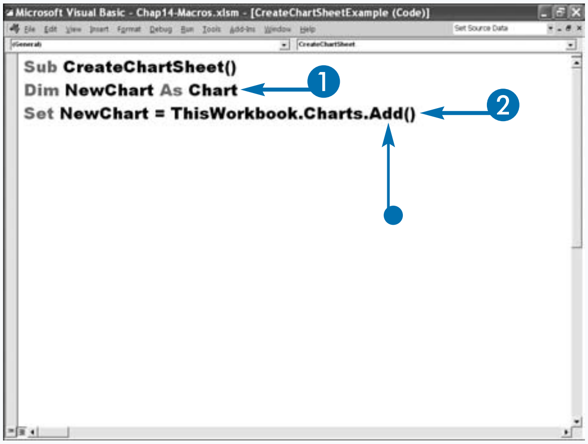
To create a new chart sheet, you use the `Add` method with the `Charts` object. After you create your chart, you can use a `With` statement to set chart properties such as chart type, the name you want to place on the chart's tab, the title of the chart, and the chart style. You select a chart type by assigning an `XlChartType` constant value to the `ChartType` property. You use the `Name` property to assign a name to the chart tab. If you want to place a title on the chart, set the `HasTitle` property to `True` and then use the `ChartTitle` property to assign the title. If you want to apply a style, assign a style number between 1 and 48 to the `ChartStyle` property. Every style in the Excel style gallery has a number, and you can run your mouse pointer over the style to find out what the number is. Use the `SetSourceData` method to tell VBA where your data is located.

Create a Chart Sheet

① Create a `Chart` object variable.

② Set the `Chart` object variable.

- Use the `Add` method to add the new chart.


Microsoft Visual Basic - Chap14-Macros.xlsm - [CreateChartSheetExample (Code)]
(General)
CreateChartSheet
1
2

```
Sub CreateChartSheet()
Dim NewChart As Chart
Set NewChart = ThisWorkbook.Charts.Add()
```

③ Create a `With` statement.

④ Use the `ChartType` property to specify a chart type.

⑤ Name the chart sheet tab.

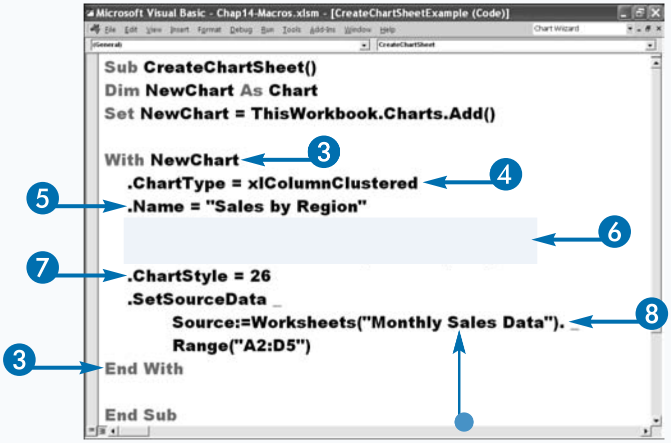
⑥ Place a title on the chart.

⑦ Assign a chart style.

⑧ Specify your data source.

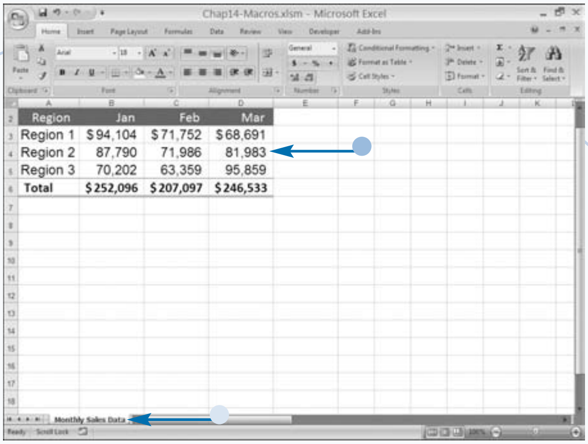
- The worksheet tab name.

⑨ Press Alt+F11 to switch from the VBE to Excel, and run your macro.


Microsoft Visual Basic - Chap14-Macros.xlsm - [CreateChartSheetExample (Code)]
(General)
CreateChartSheet
3
4
5
6
7
8
3

```
Sub CreateChartSheet()
Dim NewChart As Chart
Set NewChart = ThisWorkbook.Charts.Add()

With NewChart
    .ChartType = xlColumnClustered
    .Name = "Sales by Region"

    .ChartStyle = 26
    .SetSourceData _
        Source:=Worksheets("Monthly Sales Data"). _
        Range("A2:D5")
End With

End Sub
```

- Your source data.
- The worksheet tab name.

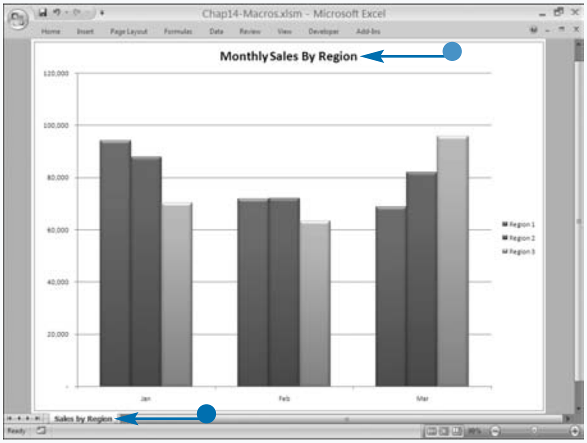

Chap14-Macros.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Ready
Scroll Lock

Region	Jan	Feb	Mar
Region 1	$94,104	$71,752	$68,691
Region 2	87,790	71,986	81,983
Region 3	70,202	63,359	95,859
Total	$252,096	$207,097	$246,533

Monthly Sales Data

The macro creates a chart.

- The tab name.
- The title.


Chap14-Macros.xlsm - Microsoft Excel
Monthly Sales By Region
120,000
100,000
80,000
60,000
40,000
20,000
-
Jan
Feb
Mar
Region 1
Region 2
Region 3
Sales by Region
Ready

Apply It

When creating a chart, you must specify the chart's data source. If you omit the data source information, your chart appears blank. You use the `SetSourceData` method to specify the data source for your chart. The following is the syntax for `SetSourceData`:

Example:

```
NewChart.SetSourceData(Source.Range, PlotBy)
```

Use the `Source` parameter to specify the actual data range your chart will use. The `Source` parameter can reference any valid data range. See Chapter 11 for more information on defining a range of values. When working with a chart sheet, you must indicate the name of the worksheet containing the data as part of the range reference. For example, the following code references the range of cells contained in Sheet1 in the same workbook.

Example:

```
NewChart.SetSourceData Source:=Worksheets("Sheet1").Range("A1:B15")
```

With the `SetSourceData` method, you can use the `PlotBy` parameter to tell VBA how to plot the data in the specified range. You assign `PlotBy` one of the `XlRowCol` constant values.

Embed a Chart in a Worksheet

You can use VBA to embed a new chart in a worksheet within a workbook. When you embed a chart, Excel creates a new Chart object. Each Chart object contains several objects that represent the settings for the chart, such as the `ChartTitle` object, which contains the chart title, its font, border properties, and other associated attributes.

When you embed a chart in a worksheet, the corresponding `Chart` object that Excel creates becomes a part of the `Worksheet` object. Because you can embed multiple charts in one worksheet, the `Worksheet` object contains a `ChartObjects` collection object that contains all `Chart` objects on the worksheet. When you add or remove embedded charts, you must use the `ChartObjects` collection object.

To add a chart to a worksheet, you must use the `Add` method with the `ChartObjects` object. The `Add` method has four parameters you can use to set the location and size of the chart in points: `Left`, `Top`, `Width`, and `Height`. Use the `Left` parameter to specify the location of the chart in relation to the left edge of column A. Use the `Top` parameter to specify the location of the chart in relation to the top edge of row A. Use the `Width` and `Height` parameters to specify the initial width and the height of the Chart object.

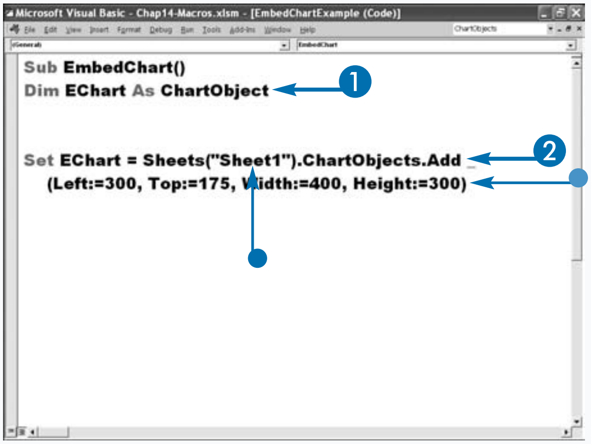
You specify the type of chart that Excel creates by using the `ChartType` property with one of the `XlChartType` constant values. For example, to create a line chart, you use the constant `xlLine`. See Appendix A for a list of the `XlChartType` constants.

Embed a Chart within a Worksheet

① Create a `Chart` object variable.

② Set the `Chart` object variable to the new chart.

- The name of the worksheet in which you want to place the chart.
- Sets the chart position and size.


Microsoft Visual Basic - Chap14-Macros.xlsm - [EmbedChartExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
EmbedChart
1
2

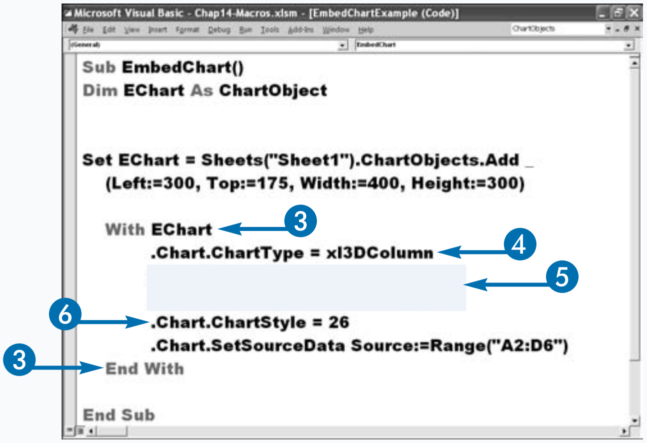
```
Sub EmbedChart()
Dim EChart As ChartObject


Set EChart = Sheets("Sheet1").ChartObjects.Add _
   (Left:=300, Top:=175, Width:=400, Height:=300)
```

③ Create a `With` statement.

④ Use the `ChartType` property to specify a chart type.

⑤ Place a title on the chart.

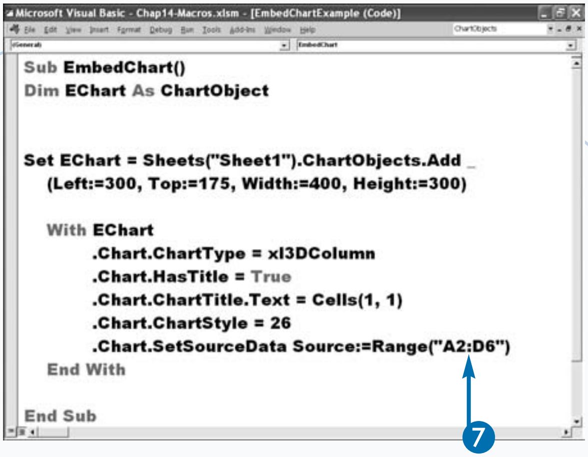
⑥ Assign a chart style.


Microsoft Visual Basic - Chap14-Macros.xlsm - [EmbedChartExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
EmbedChart
3
4
5
6
3

```
Sub EmbedChart()
Dim EChart As ChartObject


Set EChart = Sheets("Sheet1").ChartObjects.Add _
   (Left:=300, Top:=175, Width:=400, Height:=300)

   With EChart
         .Chart.ChartType = xl3DColumn

         .Chart.ChartStyle = 26
         .Chart.SetSourceData Source:=Range("A2:D6")
   End With

End Sub
```

⑦ Specify your data source.

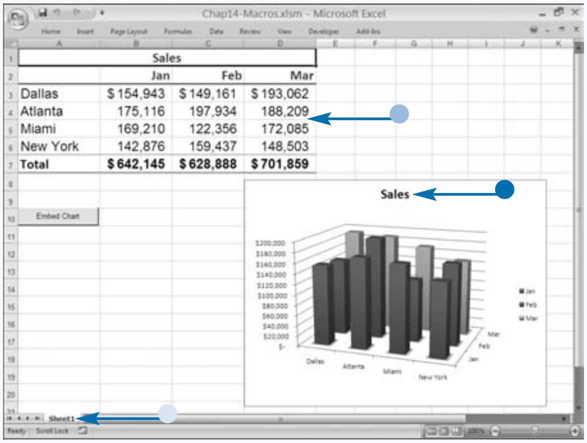
⑧ Press Alt+F11 to switch from the VBE to Excel, and run your macro.


Microsoft Visual Basic - Chap14-Macros.xlsm - [EmbedChartExample (Code)]
(General)
EmbedChart
7

```
Sub EmbedChart()
Dim EChart As ChartObject


Set EChart = Sheets("Sheet1").ChartObjects.Add _
   (Left:=300, Top:=175, Width:=400, Height:=300)

   With EChart
        .Chart.ChartType = xl3DColumn
        .Chart.HasTitle = True
        .Chart.ChartTitle.Text = Cells(1, 1)
        .Chart.ChartStyle = 26
        .Chart.SetSourceData Source:=Range("A2:D6")
   End With

End Sub
```

The macro creates your chart.

- Your source data.
- The tab name.
- The title.


Chap14-Macros.xlsm - Microsoft Excel
Embed Chart
Sales
$200,000
$180,000
$160,000
$140,000
$120,000
$100,000
$80,000
$60,000
$40,000
$20,000
$-
Dallas
Atlanta
Miami
New York
Jan
Feb
Mar
Jan
Feb
Mar
Sheet1

Sales			
	Jan	Feb	Mar
Dallas	$ 154,943	$ 149,161	$ 193,062
Atlanta	175,116	197,934	188,209
Miami	169,210	122,356	172,085
New York	142,876	159,437	148,503
Total	**$ 642,145**	**$ 628,888**	**$ 701,859**

Extra

The only real difference between embedded charts and chart sheets is the `Chart` object for an embedded chart is part of the `ChartObjects` collection for the worksheet, whereas the `Chart` object for a chart sheet is part of the `Workbook` object. If you compare the code that creates an embedded chart to the code that adds a new chart sheet, you will notice that with an embedded chart, specifying chart methods and properties requires reference to the `Chart` object. This is because when you create a new chart sheet, you create a new `Chart` object, but when you create an embedded chart, you add a `Chart` object to the `ChartObjects` collection for the worksheet; therefore the `Chart` object becomes a child of the `ChartObjects` collection object. To set the chart type of an embedded chart, you can use the following code:

Example:

```
Worksheets("Sheet1").ChartObject(1).Chart.ChartType = xlColumnStacked
```

This code sets the chart type of the first chart object in the worksheet named Sheet1 to a stacked column chart. If you compare this code to the code required for changing the chart type of a chart sheet, you can see the similarities.

Example:

```
Sheets("Chart1").ChartType = xlColumnStacked
```

Apply Chart Wizard Settings to a Chart

When writing VBA code, you can use the `ChartWizard` method to format or reformat a chart quickly. You use the `ChartWizard` method with a `Chart` object. This method has 11 optional parameters that enable you to set chart properties. The following is the syntax for the `ChartWizard` method:

```
expression.ChartWizard(Source, Gallery,
Format, PlotBy, CategoryLabels,
SeriesLabels, HasLegend, Title,
CategoryTitle, ValueTitle, ExtraTitle)
```

Use the Source parameter to specify or modify the chart's data source. When you are working with a chart sheet, you must specify the name of the worksheet that contains the data source. Use the `Gallery` parameter to specify the chart type. Assign one of the `XlChartType` constant values to indicate the desired chart type. See Appendix A for a list of `XlChartType` constants.

Specify a value of 1 to 10 for the `Format` parameter. The `Format` parameter applies one of VBA's built-in formats. The format that it uses depends on the chart type you select. The `PlotBy` parameter tells VBA whether the data series is in rows or columns. Assign the `PlotBy` parameter `xlRows` if the data series is in rows. Assign it `xlColumns` if the data series is in columns.

Assign an integer value to the `CategoryLabels` and `SeriesLabels` parameters to indicate the number of rows or columns in the category or series that have labels. Assign the `HasLegend` parameter the value `True` if you want your chart to have a legend.

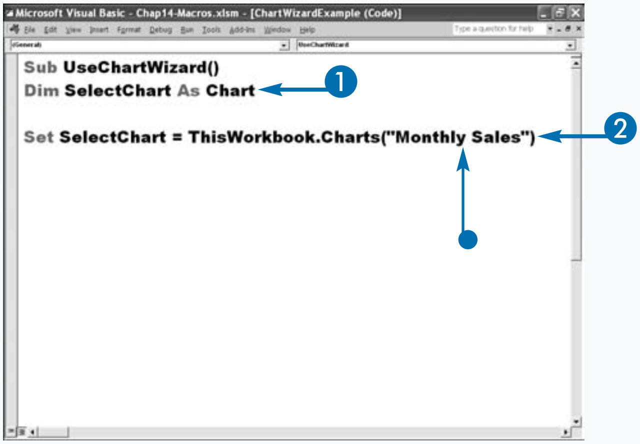
Use the `Title` parameter to assign a title to your chart, the `CategoryTitle` parameter to assign a title to your horizontal axis, and the `ValueTitle` parameters to assign a title to your left vertical axis. For a 3-D chart, you use the `ExtraTitle` parameter to assign a title to your depth axis. You must set any additional properties individually.

Apply Chart Wizard Settings to a Chart

① Create a `Chart` object variable.

② Set the `Chart` object variable to the chart you want to modify.

- The name of the chart sheet.


Microsoft Visual Basic - Chap14-Macros.xlsm - [ChartWizardExample (Code)]

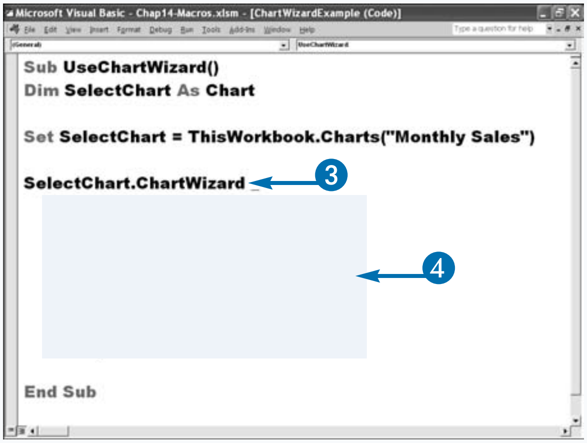
```
Sub UseChartWizard()
Dim SelectChart As Chart

Set SelectChart = ThisWorkbook.Charts("Monthly Sales")
```

File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Type a question for help
(General)
UseChartWizard
1
2

③ Create your `ChartWizard` command.

④ Set your parameters.

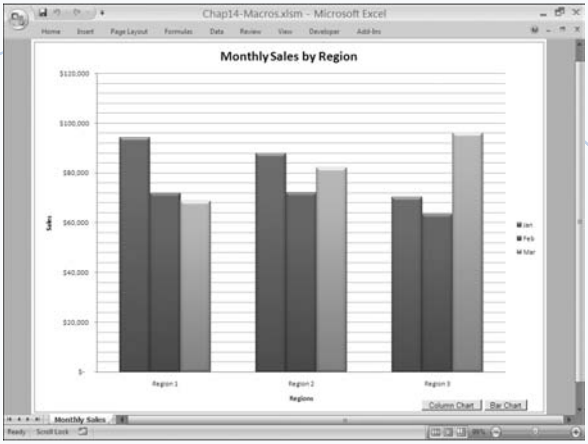
⑤ Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap14-Macros.xlsm - [ChartWizardExample (Code)]

```
Sub UseChartWizard()
Dim SelectChart As Chart

Set SelectChart = ThisWorkbook.Charts("Monthly Sales")

SelectChart.ChartWizard _



End Sub
```

File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Type a question for help
(General)
UseChartWizard
3
4

Your chart before you apply the macro.


Chap14-Macros.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
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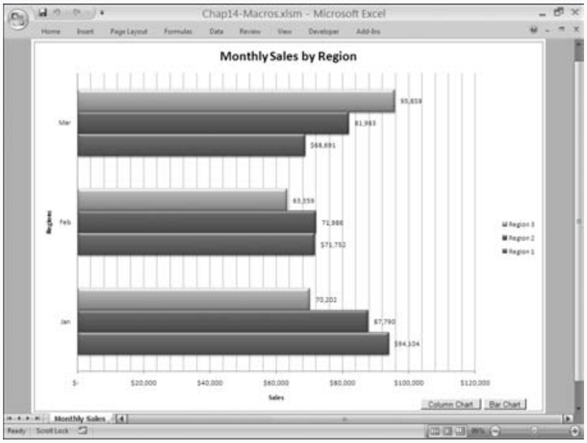
Developer
Add-Ins
Monthly Sales by Region
$120,000
$100,000
$80,000
$60,000
$40,000
$20,000
$-
Sales
Region 1
Region 2
Region 3
Regions
Jan
Feb
Mar
Column Chart
Bar Chart
Monthly Sales
Ready
Scroll Lock

Your chart after you apply the macro.

Your macro changes the format of your chart.


Chap14-Macros.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
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Review
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Developer
Add-Ins
Monthly Sales by Region
Mar
Feb
Jan
Regions
95,859
81,983
$68,691
63,259
71,986
$71,752
70,202
87,790
$94,104
$-
$20,000
$40,000
$60,000
$80,000
$100,000
$120,000
Sales
Region 3
Region 2
Region 1
Column Chart
Bar Chart
Monthly Sales
Ready
Scroll Lock

Extra

When working in Excel, once you have your chart designed exactly the way you want it, you can save your design as a template. You can also use VBA to save your chart as a template.

Example:

```
Sub CreateTemplate()
Dim SelectChart as Chart
Set SelectChart = ThisWorkbook.Charts("Monthly Sales")
SelectChart. _
     SaveChartTemplate("My Template")
End Sub
```

To apply your template to an existing chart, in Excel, click your chart. The Chart tools become available. Click the Design tab. Click Change Chart Type in the Type group. The Change Chart Type dialog box appears. Click Templates, click your template, and then click OK. Excel applies your template to your chart.

Add a New Data Series to a Chart

A data series is a group of data values that Excel displays in your chart. Each data series appears as a legend item. After you create a chart, you can redefine the range of data Excel uses to display values in your chart by adding a new data series. For example, if you have a bar chart showing the sales in Regions 1, 2, and 3 for January, February, and March, you can add another data series that contains the sales data for April.

The `SeriesCollection` collection object contains all of the data series that Excel plots on a specific chart, with each data series representing a `Series` object. To define a new data series, create a new `Series` object and add it to the `SeriesCollection` collection object by using the `Add` method.

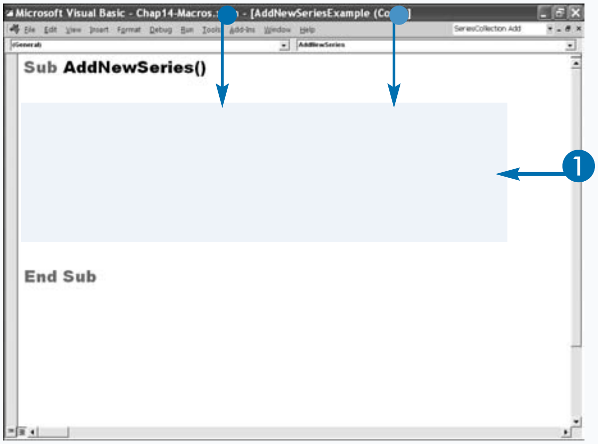
When used with the `SeriesCollection` object, the `Add` method has five parameters: `Source`, `Rowcol`, `SeriesLabels`, `CategoryLabels`, and `Replace`. Use the `Source` parameter to specify the data series you want to add to the chart. Use the `Rowcol` parameter to tell VBA whether the new series is in a row or a column. Use `xlRows` if the data series is in a row, or use `xlColumns` if the data series is in a column.

Set the `SeriesLabels` to `True` if the first row or column of the data series contains a label. Set the `CategoryLabels` to `True` if the first row or column of the data series contains a category label. Category labels display on the horizontal axis of your chart. If you specify a value of `True` for the `CategoryLabels` parameter and for the `Replace` parameter, Excel replaces the current category labels with the labels from the new range.

Add a New Data Series to a Chart

① Create your `SeriesCollection` `Add` statement.

- The worksheet name.
- Identifies the chart.


Microsoft Visual Basic - Chap14-Macros.xlsm - [AddNewSeriesExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
SeriesCollection Add
(General)
AddNewSeries
1

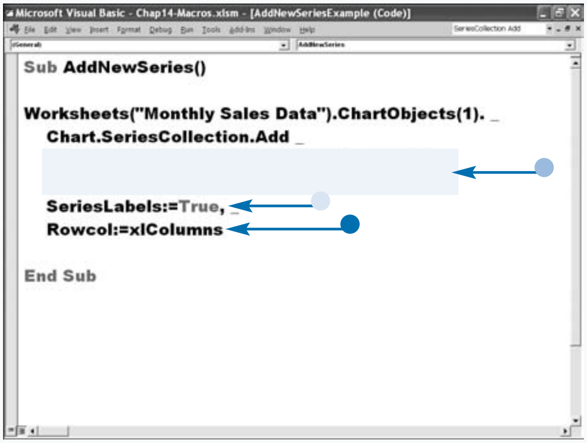
```
Sub AddNewSeries()



End Sub
```

- The data series you want to add.
- Tells VBA that the series has labels.
- Tells VBA the data is organized in columns.

② Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap14-Macros.xlsm - [AddNewSeriesExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
SeriesCollection Add
(General)
AddNewSeries

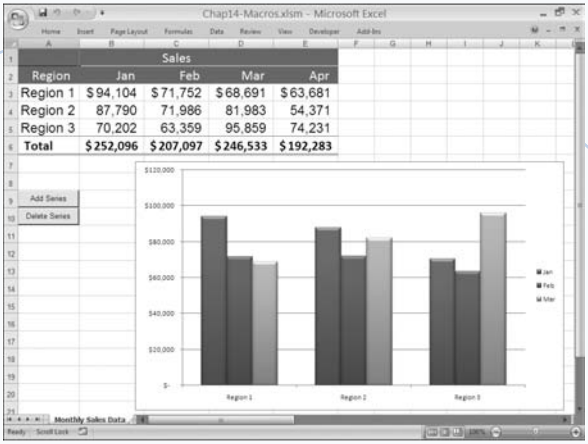
```
Sub AddNewSeries()

Worksheets("Monthly Sales Data").ChartObjects(1). _
   Chart.SeriesCollection.Add _

   SeriesLabels:=True, _
   Rowcol:=xlColumns

End Sub
```

Your chart before you apply the macro.


Chap14-Macros.xlsm - Microsoft Excel
Home
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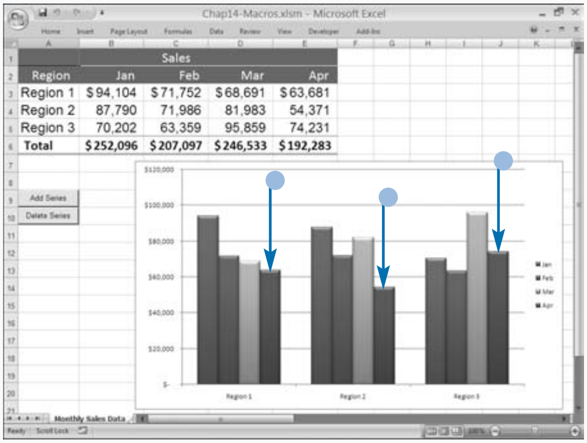
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Add Series
Delete Series
$120,000
$100,000
$80,000
$60,000
$40,000
$20,000
$-
Region 1
Region 2
Region 3
Jan
Feb
Mar
Monthly Sales Data
Ready
Scroll Lock

	Sales			
Region	Jan	Feb	Mar	Apr
Region 1	$94,104	$71,752	$68,691	$63,681
Region 2	87,790	71,986	81,983	54,371
Region 3	70,202	63,359	95,859	74,231
Total	**$252,096**	**$207,097**	**$246,533**	**$192,283**

Your chart after you apply the macro.

- The macro adds a new data series.


Chap14-Macros.xlsm - Microsoft Excel
Home
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Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Add Series
Delete Series
$120,000
$100,000
$80,000
$60,000
$40,000
$20,000
$-
Region 1
Region 2
Region 3
Jan
Feb
Mar
Apr
Monthly Sales Data
Ready
Scroll Lock

	Sales			
Region	Jan	Feb	Mar	Apr
Region 1	$94,104	$71,752	$68,691	$63,681
Region 2	87,790	71,986	81,983	54,371
Region 3	70,202	63,359	95,859	74,231
Total	**$252,096**	**$207,097**	**$246,533**	**$192,283**

Extra

Each chart embedded in a worksheet is a member of the worksheet's `ChartObjects` collection. Each chart in the worksheet's `ChartObjects` collection has an index number. The first chart is `ChartObjects(1)`, the second chart is `ChartObjects(2)`, and so on. You can refer to a chart by its index number. You can also refer to a chart by its name. To find what a chart's name, in Excel, click your chart. The Chart tools become available. Click the Layout tab, and then click Properties. The chart name appears.

Each chart sheet in a workbook is part of the `Charts` collection. Each member of the `Charts` collection has an index number. The leftmost chart is `Chart(1)`, the next chart is `Chart(2)`, and so on. You can refer to Chart objects by their index number.

You can remove a series from a chart using the `Delete` method. The following code removes the series that was added in the example.

Example:

```
Worksheets("Monthly Sales Data")._
ChartObjects(1)._
Chart.SeriesCollection("Apr") _
.Delete
```

Format Chart Text

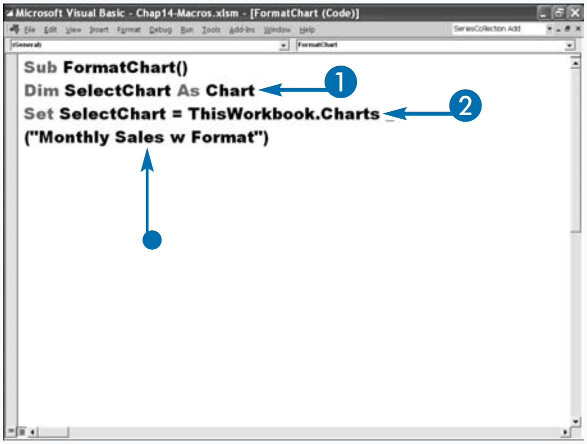
As with all text elements in a workbook, you can format the text that displays in your chart by changing the `Font` properties. When Excel adds text to a chart, such as a chart title, axis label, or even data label, it applies default formatting. You can reformat the text by using the `Font` object properties. By setting the `Font` properties, you can make your chart easier to read.

The chart area encompasses everything in your chart. By applying `Font` object properties to the `ChartArea` object, you can set the font attributes for all of the text in the chart. For example, if you want to change the font color for the entire chart, you apply the `Font` object `Color` property to the `ChartArea` object.

Excel also enables you to format individual elements of text that display in your chart. For example, if you use the `Font` object properties with the `ChartTitle` object, you can modify the chart title. To change how Excel displays legend text, use the `Font` object properties with the `Legend` object.

You can use the `ChartArea` object to set the font settings for the entire chart and then use the individual objects to customize various portions of the chart. You can set the properties for any of the following objects by using the Font object: `ChartTitle`, `DataTable`, `Legend`, `Characters`, `AxisTitle`, `DataLabel`, and `TickLabels`. See Chapter 11, "Using the Cells Property" to see a partial list of the Font properties you can set.

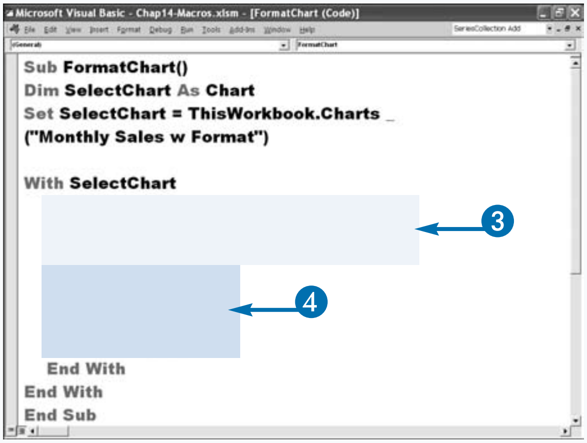
Format Chart Text


Microsoft Visual Basic - Chap14-Macros.xlsm - [FormatChart (Code)]
(General)
FormatChart
1
2

```
Sub FormatChart()
Dim SelectChart As Chart
Set SelectChart = ThisWorkbook.Charts _
("Monthly Sales w Format")
```

1. Create a `Chart` object variable.
2. Set the `Chart` object variable to the chart you want to format.

- The name of the chart sheet tab.


Microsoft Visual Basic - Chap14-Macros.xlsm - [FormatChart (Code)]
(General)
FormatChart
3
4

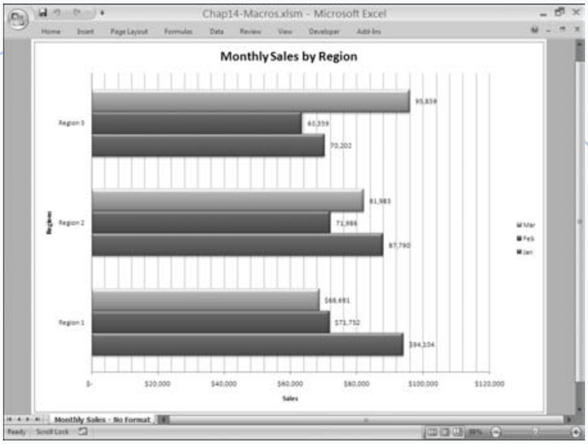
```
Sub FormatChart()
Dim SelectChart As Chart
Set SelectChart = ThisWorkbook.Charts _
("Monthly Sales w Format")

With SelectChart

    End With
End With
End Sub
```

3. Format the text in the chart area.
4. Format the chart title.
5. Press Alt+F11 to switch from the VBE to Excel, and run the macro.

The chart without formatting.


Chap14-Macros.xlsm - Microsoft Excel
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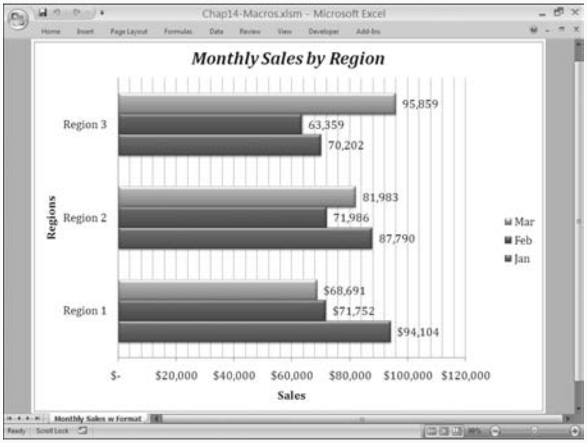
Add-Ins
Monthly Sales by Region
Region 3
Region 2
Region 1
Region
95,859
63,359
70,202
81,983
71,986
87,790
$68,691
$71,752
$94,104
Mar
Feb
Jan
$-
$20,000
$40,000
$60,000
$80,000
$100,000
$120,000
Sales
Monthly Sales - No Format
Ready
Scroll Lock

The macro formats the data.

The chart with formatting.


Chap14-Macros.xlsm - Microsoft Excel
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Page Layout
Formulas
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Review
View
Developer
Add-Ins
Monthly Sales by Region
Region 3
Region 2
Region 1
Regions
95,859
63,359
70,202
81,983
71,986
87,790
$68,691
$71,752
$94,104
Mar
Feb
Jan
$-
$20,000
$40,000
$60,000
$80,000
$100,000
$120,000
Sales
Monthly Sales w Format
Ready
Scroll Lock

Apply It

You may not want to apply the same font settings to an entire `Chart` object. For example, you may want to underline the first character in the chart title. With the `AxisTitle`, `ChartTitle`, and `DataLabel` objects, you can use the `Characters` object to specify the character within the text string where formatting should start, as well as the number of characters to format. For example, to underline the first two characters in a chart title, type code similar to that shown in the example. The `Characters` object has two parameters: `Start` and `Length`. Use the `Start` parameter to indicate the character in the text string at which VBA should begin applying the format. Use the `Length` parameter to indicate the number of characters to which VBA should apply the format.

TYPE THIS:

```
ThisWorkbook.Charts(1).ChartTitle.
Characters(1,2).Font.Underline = True
```

RESULT:

Excel underlines the first and second characters in the chart title, but all remaining characters maintain their original font settings.

Create Charts with Multiple Chart Types

If you show more than one type of data in your chart, you may want to create a chart that uses a different chart type for each data series. For example, if your chart displays the population of various cities and the average income in those cities, you may want to create a column chart to display population, and a line chart to display average income. A chart that uses more than one chart type is called a *combination chart*.

To set the chart type for a data series, use the `SeriesCollection` object. The `SeriesCollection` collection object contains each of the data series in the range of data shown in your chart as an individual `SeriesCollection` object. You reference an individual object by using an index value. VBA numbers each data series. The first data series is `SeriesCollection(1)`, the second is `SeriesCollection(2)`, and so on.

To set the chart type for a data series, you set the `ChartType` property for the specific `SeriesCollection` object. When you initially create your chart, you can use this method to set the chart type for each individual data series, or you can set the chart type for the entire chart, and then modify the `ChartType` property for the individual data series you want to change.

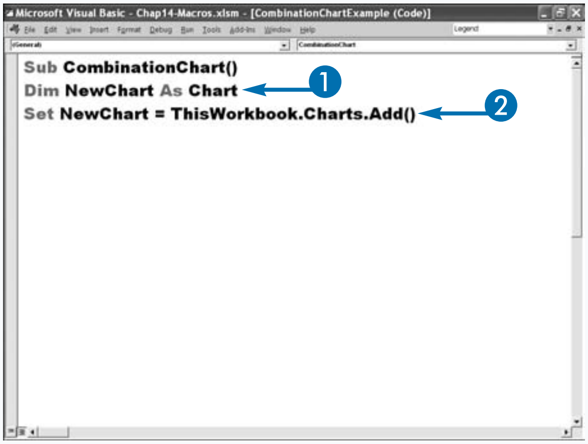
When you use the `ChartType` property, you assign it an `XlChartType` constant value that represents the chart type you want to use for the data series. See Appendix A for a list of the `XlChartType` constant values that you can assign to the `ChartType` property.

Create Charts with Multiple Chart Types

① Create a `Chart` object variable.

② Set the `Chart` object variable.

- Use the `Add` method to add a new chart.


Microsoft Visual Basic - Chap14-Macros.xlsm - [CombinationChartExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Legend
(General)
CombinationChart
1
2

```
Sub CombinationChart()
Dim NewChart As Chart
Set NewChart = ThisWorkbook.Charts.Add()
```

③ Set your data source.

④ Assign a chart type to your chart.

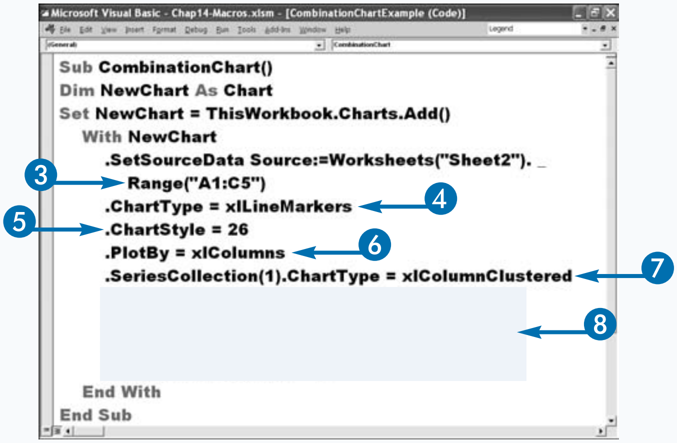
⑤ Assign a chart style to your chart.

⑥ Tell VBA whether your data is in columns or rows.

⑦ Assign a new chart type to a data series.

In this example, you assign a new chart type to series 1.

⑧ Format your chart.

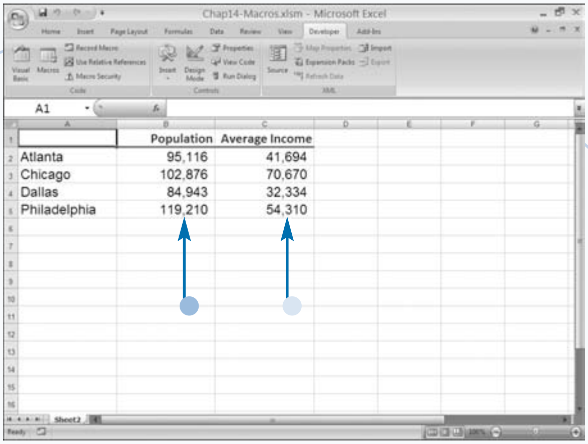

Microsoft Visual Basic - Chap14-Macros.xlsm - [CombinationChartExample (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Legend
(General)
CombinationChart
3
4
5
6
7
8

```
Sub CombinationChart()
Dim NewChart As Chart
Set NewChart = ThisWorkbook.Charts.Add()
    With NewChart
        .SetSourceData Source:=Worksheets("Sheet2"). _
            Range("A1:C5")
        .ChartType = xlLineMarkers
        .ChartStyle = 26
        .PlotBy = xlColumns
        .SeriesCollection(1).ChartType = xlColumnClustered



    End With
End Sub
```

9. Press Alt+F11 to switch from the VBE to Excel, and run the macro.

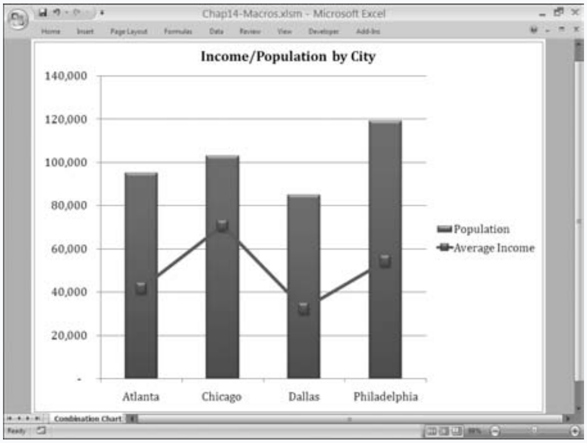
Your data source.

- ● Series 1.
- ● Series 2.



	Population	Average Income
Atlanta	95,116	41,694
Chicago	102,876	70,670
Dallas	84,943	32,334
Philadelphia	119,210	54,310

The macro creates a combination chart.



Extra

You can use a different chart type for each data series. Excel keeps track of the data series chart types, and groups the common types together as `ChartGroup` objects. Each `ChartGroup` object contains one or more data series with the same chart type. Excel stores all `ChartGroup` objects within the `ChartGroups` collection object, which you can access through the `ChartGroup` property.

The `ChartGroups` object provides methods for returning the collection of the `ChartGroup` objects that correspond to a particular type. For example, if you want to access the line chart type `ChartGroup` objects, you can use the `LineGroups` method. The example that follows illustrates how to count the number of column chart types in a chart. You can use the methods shown in the table with the `ChartGroup` objects.

Example:

```
DataSeriesCount = ThisWorkbook.Charts(1).ColumnGroups.Count
```

METHOD	DESCRIPTION
`AreaGroups`	Determines the number of series with an area data type.
`BarGroups`	Determines the number of series with a bar chart data type.
`ColumnGroups`	Determines the number of series with a column chart data type.
`DoughnutGroups`	Determines the number of series with a doughnut chart data type.
`LineGroups`	Determines the number of series with a line chart data type.
`PieGroups`	Determines the number of series with a pie chart data type.

Add a Data Table to the Chart

A data table displays the values in your chart. You can add data tables to any chart you create. VBA stores the data table associated with a chart in the `DataTable` object. Use the `HasDataTable` property to tell VBA whether you want to include a data table in your chart. This property accepts the Boolean values of `True` and `False`. If you want to display a data table, set this property to `True`. Conversely, if you do not want to display a data table, set this property to `False`.

After you set the `HasDataTable` property, you can format your data table by using the methods and properties associated with the `DataTable` object. You specify the font by using the `Font` properties. For example, `DataTable.Font.Name = "Arial"` tells VBA to use an Arial font in the data table. See the section, "Format Chart Text," for more information on working with the `Font` object in a chart.

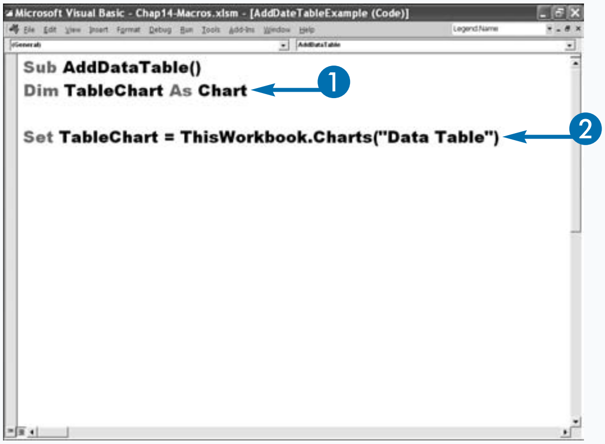
You can choose to display or not display borders in and around your data table by using the `HasBorderHorizontal`, `HasBorderOutline`, and `HasBorderVertical` properties. By default, Excel displays all borders on a data table. If you do not want to display one or more of these borders, set their value to `False`. For example, the following code removes the horizontal border from a data table:

```
.DataTable.HasBorderHorizontal = False
```

A legend key tells the user what each data series represents. You can use the `ShowLegendKey` property to tell VBA whether you want to show a legend key in your data table.

Add a Data Table to the Chart

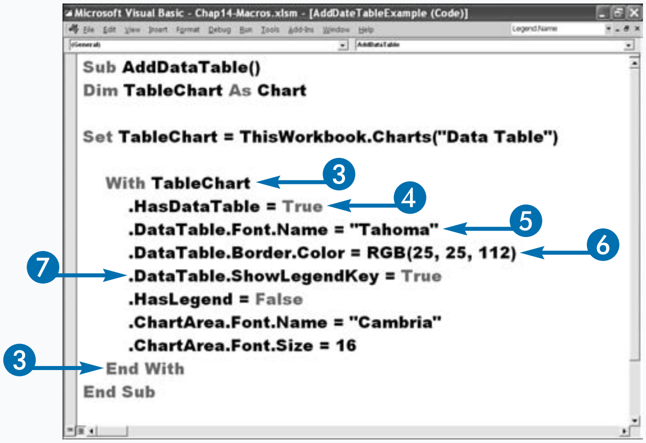
1. Create a `Chart` object variable.
2. Set the `Chart` object variable to the chart to which you want to add a data table.


Microsoft Visual Basic - Chap14-Macros.xlsm - [AddDateTableExample (Code)]
(General)
AddDataTable
1
2

```
Sub AddDataTable()
Dim TableChart As Chart

Set TableChart = ThisWorkbook.Charts("Data Table")
```

3. Create a `With` statement.
4. Set the `HasDataTable` property to `True`.
5. Assign a font to your data table.
6. Assign a border color.
7. Set the `ShowLegendKey` property for the data table to `True`.

This code shows a legend in the data table.


Microsoft Visual Basic - Chap14-Macros.xlsm - [AddDateTableExample (Code)]
(General)
AddDataTable
3
4
5
6
7
3

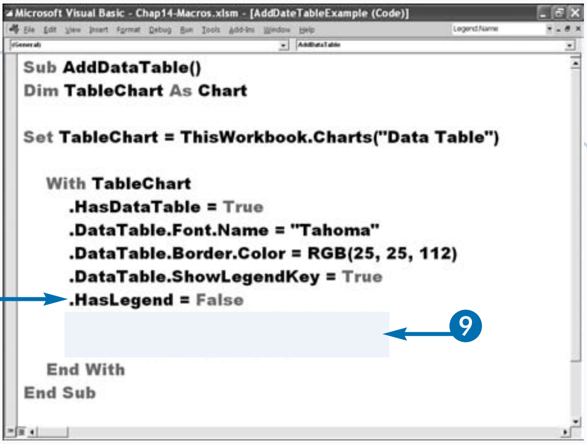
```
Sub AddDataTable()
Dim TableChart As Chart

Set TableChart = ThisWorkbook.Charts("Data Table")

    With TableChart
        .HasDataTable = True
        .DataTable.Font.Name = "Tahoma"
        .DataTable.Border.Color = RGB(25, 25, 112)
        .DataTable.ShowLegendKey = True
        .HasLegend = False
        .ChartArea.Font.Name = "Cambria"
        .ChartArea.Font.Size = 16
    End With
End Sub
```

⑧ Set the `HasLegend` property for the chart to `False`.

This code suppresses the chart legend.

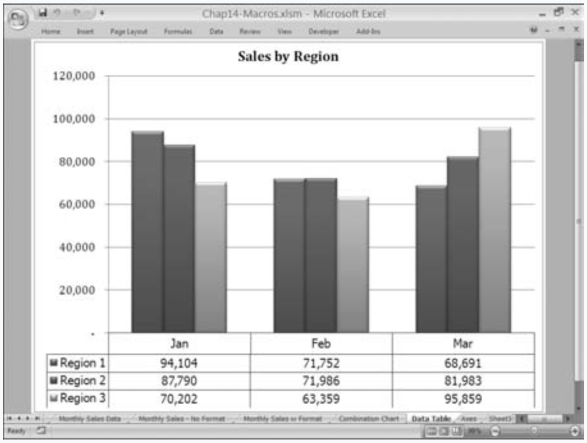
⑨ Set the chart area properties.

⑩ Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Chap14-Macros.xlsm - [AddDateTableExample (Code)]
(General)
AddDataTable
8
9

```
Sub AddDataTable()
Dim TableChart As Chart

Set TableChart = ThisWorkbook.Charts("Data Table")

    With TableChart
        .HasDataTable = True
        .DataTable.Font.Name = "Tahoma"
        .DataTable.Border.Color = RGB(25, 25, 112)
        .DataTable.ShowLegendKey = True
        .HasLegend = False

    End With
End Sub
```

The macro creates a chart with a data table.


Chap14-Macros.xlsm - Microsoft Excel
Sales by Region
120,000
100,000
80,000
60,000
40,000
20,000
-

	Jan	Feb	Mar
▪ Region 1	94,104	71,752	68,691
▪ Region 2	87,790	71,986	81,983
▪ Region 3	70,202	63,359	95,859

Extra

When you add a data table to a chart, you can include the chart legend with the data table. To create a data table that contains a chart legend, set the `ShowLegendKey` property to `True` for the `DataTable` object. The following example sets the value of the `ShowLegendKey` property.

Example:

```
ThisWorkbook.Charts(1).DataTable _
.ShowLegendKey = True
```

If you display the legend as part of your data table, you typically do not want the legend to display separately on your chart. To hide the chart legend, set the `HasLegend` property for the Chart object to `False`.

Example:

```
ThisWorkbook.Charts(1).HasLegend = False
```

Customize a Chart Axis

You can customize each axis on your chart with the `Axis` object methods and properties. Most charts that you create have two axes, a category axis and a values axis. For example, if you look at a column chart, the category axis runs horizontally across the bottom, while the values axis runs vertically along the left side of the chart. When working with 3-D charts, there is also a series axis, which shows the depth.

Each chart axis is a separate `Axis` object. The `Axes` collection object contains all of the `Axis` objects for a chart. You can use the `Axes` method to access an individual chart's Axis objects. When using the `Axes` method, use one of the `XlAxisType` constants to indicate the axis type. Use `xlValue` for the value axis, `xlCategory` for the category axis, or `xlSeriesAxis` for the depth axis on a 3-D chart.

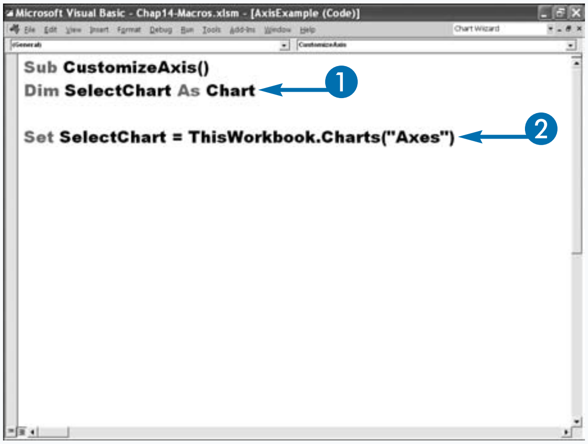
You can modify each axis by using the `AxisTitle`, `Border`, `Gridlines`, `DisplayUnitLabel`, and `TickLabels` child objects. Each of these objects has child objects and corresponding methods and properties. The `AxisTitle` object represents the title that Excel adds to the axis. You can modify the appearance of the axis title by using the `Font` object properties. See the section, "Format Chart Text" for more information on working with the `Font` object in a chart. If you set the `HasTitle` property to `True`, you can assign an axis title. You can also modify other objects. For example, the `Border` object refers to the axis border. The following code changes the color of your border to blue.

```
.Border.Color = RGB(0,0,255)
```

Customize the Chart Axis

① Create a `Chart` object variable.

② Set the `Chart` object variable to the chart for which you want to modify an axis.


Microsoft Visual Basic - Chap14-Macros.xlsm - [AxisExample (Code)]
(General)
CustomizeAxis
1
2

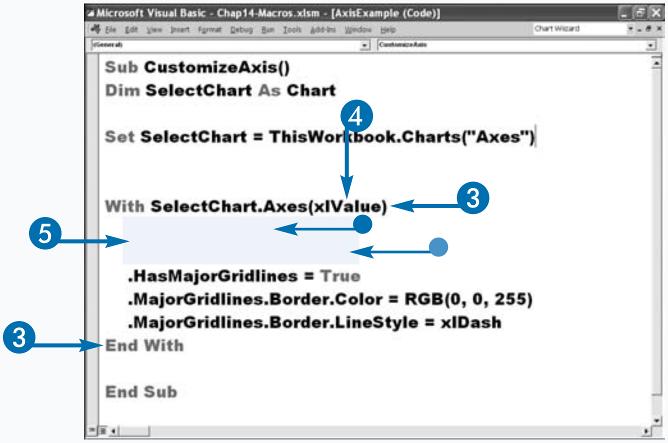
```
Sub CustomizeAxis()
Dim SelectChart As Chart

Set SelectChart = ThisWorkbook.Charts("Axes")
```

③ Create a `With` statement.

④ Tell VBA which axis you want to modify.

⑤ Assign a title to the axis.

- Sets the `HasTitle` property to `True`.
- Assigns the title.


Microsoft Visual Basic - Chap14-Macros.xlsm - [AxisExample (Code)]
(General)
CustomizeAxis
4
3
5
3

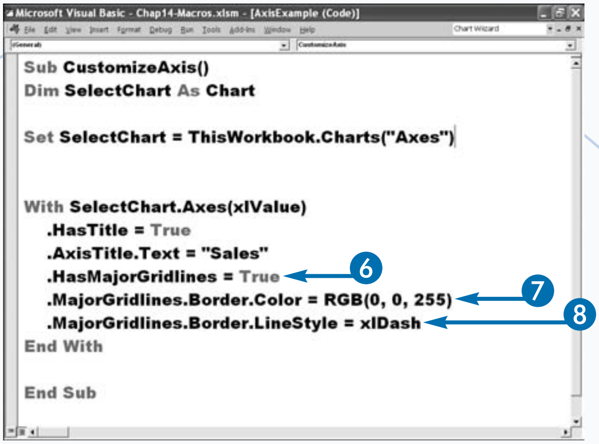
```
Sub CustomizeAxis()
Dim SelectChart As Chart

Set SelectChart = ThisWorkbook.Charts("Axes")


With SelectChart.Axes(xlValue)


    .HasMajorGridlines = True
    .MajorGridlines.Border.Color = RGB(0, 0, 255)
    .MajorGridlines.Border.LineStyle = xlDash
End With

End Sub
```

⑥ Place major gridlines on the chart.

⑦ Assign a major gridline border color.

⑧ Assign a major gridline borderline style.

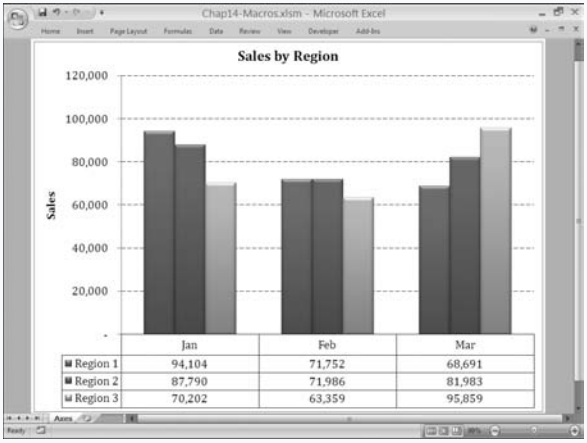
⑨ Press Alt+F11 to switch from the VBE to Excel, and run the macro.



Microsoft Visual Basic - Chap14-Macros.xlsm - [AxisExample (Code)]
(General)
CustomizeAxis
6
7
8

```
Sub CustomizeAxis()
Dim SelectChart As Chart

Set SelectChart = ThisWorkbook.Charts("Axes")


With SelectChart.Axes(xlValue)
    .HasTitle = True
    .AxisTitle.Text = "Sales"
    .HasMajorGridlines = True
    .MajorGridlines.Border.Color = RGB(0, 0, 255)
    .MajorGridlines.Border.LineStyle = xlDash
End With

End Sub
```

The macro creates a chart with an axis label and gridlines.



Chap14-Macros.xlsm - Microsoft Excel
Sales by Region
120,000
100,000
80,000
60,000
40,000
20,000
-
Sales
Axes

	Jan	Feb	Mar
■ Region 1	94,104	71,752	68,691
■ Region 2	87,790	71,986	81,983
■ Region 3	70,202	63,359	95,859

Extra

Gridlines mark major and minor intervals in your chart. For example, if your axis values run from 0 to 200,000, then major gridlines might appear at 20,000, 40,000, 60,000, and so on. Minor gridlines might appear at 2,000, 4,000, 6,000, and so on. Gridlines run either horizontally or vertically from the corresponding axis. You can use the Gridlines object to add both major and minor gridlines. The following code illustrates how to use the `HasMajorGridlines` property to turn on the gridlines, and how to customize the appearance of the gridlines with the `MajorGridlines` properties. Notice that the code customizes the appearance of the gridlines for the specified axis by using the `Border` object. You can use the following properties with the `Border` object: `Color`, `ColorIndex`, `LineStyle`, `Parent`, and `Weight`.

Example:

```
With Charts(1).Axes(xlValue)
        .HasMajorGridlines = True
        .MajorGridlines.Border.Color = RGB(0,255,0)
        .MajorGridlines.Border.LineStyle = xlDot
        .MajorGridlines.Border.Weight = xlThin
End With
```

Understanding Excel Events

An event occurs in Excel whenever the user performs any type of action. For example, the user closes the workbook. You can use events to trigger the execution of a procedure by creating an event-handling procedure. Event-handling procedures are procedures that execute when a particular event occurs.

There are five categories of events: workbook, worksheet, chart, UserForm, and application events. To trap or capture an event with an event-handling procedure, you must place the procedure code in the correct type of module. For example, workbook-related events must be in the `ThisWorkbook` object standard module.

Each event category has a set of events associated with it. For example, the `BeforeClose` event is a workbook event that is activated when the user chooses to close a workbook, before the workbook closes.

Workbook Events

Excel associates workbook-level events with the workbook in which they reside. You place workbook-level event procedures in the `ThisWorkbook` object module. You create workbook event procedures by naming them `Workbook_event` *Name*. The following table lists the workbook events.

EVENT	WHEN THE EVENT OCCURS
`Activate`	Occurs when Excel activates a workbook.
`AddinInstall`	Occurs when a workbook is installed as an add-in.
`AddinUninstall`	Occurs when a workbook is uninstalled as an add-in.
`AfterXmlExport`	Occurs after XML data saves or the export of XML data.
`AfterXMLImport`	Occurs after XML data is refreshed or imported.
`BeforeClose`	Occurs before a workbook closes. See the section “Run a Procedure before Closing a Workbook.”
`BeforePrint`	Occurs before Excel prints a portion of a workbook.
`BeforeSave`	Occurs before Excel saves a workbook. See the section “Run a Procedure before Saving a Workbook.”
`BeforeXmlExport`	Occurs before XML data saves or the export of XML data.
`BeforeXMLImport`	Occurs before XML data is refreshed or imported.
`Deactivate`	Occurs when Excel deactivates a workbook.
`NewSheet`	Occurs when Excel adds a new sheet to a workbook.
`Open`	Occurs when Excel opens a workbook. See the section “Run a Procedure as a Workbook Opens.”
`PivotTableCloseConnection`	Occurs after a Pivot table report closes the data source connection.
`PivotTableOpenConnection`	Occurs after a Pivot table report opens the data source connection.
`Rowset Complete`	Occurs when a user drills through a recordset.
`SheetActivate`	Occurs when Excel activates a sheet in the workbook.
`SheetBeforeDoubleClick`	Occurs when a user double-clicks a sheet.
`SheetBeforeRightClick`	Occurs when a user right-clicks.
`SheetCalculate`	Occurs after Excel calculates a sheet.
`SheetChange`	Occurs when cells in a worksheet change.

Workbook Events *(continued)*

EVENT	WHEN THE EVENT OCCURS
`SheetDeactivate`	Occurs when Excel deactivates a sheet.
`SheetFollowHyperlink`	Occurs when a user clicks a hyperlink on a sheet.
`SheetPivotTableUpdate`	Occurs after Excel updates a sheet of a Pivot table report.
`SheetSelectionChange`	The selection changes in a worksheet.
`Sync`	Occurs when a local copy of a worksheet is synchronized with a copy on the server.
`WindowActivate`	Occurs when Excel activates a workbook window.
`WindowDeactivate`	Occurs when Excel deactivates a workbook window.
`WindowResize`	Occurs when Excel resizes a workbook window.

UserForm Events

Excel associates `UserForm` events not only with the form but also with the controls that exist on the form. Event-handling procedures related to a `UserForm` should be in the standard module for the `UserForm` object. The following table lists the `UserForm` events.

EVENT	WHEN THE EVENT OCCURS
`Activate`	Occurs when Excel activates a UserForm.
`AddControl`	Occurs when Excel adds a run-time control to a UserForm.
`BeforeDragOver`	Occurs when the user performs a drag-and-drop operation.
`BeforeDropOrPaste`	Occurs when the user is about to paste the data from the drag-and-drop operation.
`BeforeUpdate`	Occurs before a data control is changed.
`Change`	Occurs when the value property changes.
`Click`	Occurs when the user clicks on a UserForm object.
`DblClick`	Occurs when the user double-clicks a UserForm object.
`Deactivate`	Occurs when the user deactivates the UserForm.
`Error`	Occurs when Excel detects a UserForm control error.
`KeyDown`	Occurs when the user presses a key.
`KeyPress`	Occurs when the user presses an ANSI key. ANSI keys produce visible characters.
`KeyUp`	Occurs when the user releases a key.
`MouseDown`	Occurs when the user presses a mouse button.
`MouseMove`	Occurs when the user moves the pointer on the UserForm.
`MouseUp`	Occurs when the user releases the pointer.
`QueryClose`	Occurs when Excel closes the UserForm.
`RemoveControl`	Occurs when Excel removes a control from the UserForm at runtime.
`Scroll`	Occurs when the user repositions a scroll box on a control.
`Terminate`	Occurs when Excel terminates the UserForm.
`Zoom`	Occurs when the user zooms the UserForm.

continued →

Understanding Excel Events (continued)

Chart Events

Excel associates chart-level events with the currently selected chart sheet. Event-handling procedures related to a chart should be in the standard module for the `chart` object. The following table lists the chart events for which you can create event-handling procedures.

EVENT	WHEN THE EVENT OCCURS
`Activate`	Occurs when Excel activates a chart sheet.
`BeforeDoubleClick`	Occurs when the user double-clicks a chart sheet.
`BeforeRightClick`	Occurs when the user right-clicks a chart sheet. See the section "Run a Procedure When Right-Clicking a Chart."
`Calculate`	Occurs after Excel plots a chart.
`Deactivate`	Occurs when Excel deactivates a chart sheet.
`DragOver`	Occurs when the user drags a range of cells over a chart.
`DragPlot`	Occurs when the user drags and drops a range of cells onto a chart.
`MouseDown`	Occurs when the user presses a mouse button while over a chart.
`MouseMove`	Occurs when the position of the pointer changes over a chart.
`MouseUp`	Occurs when the user releases the mouse button over a chart.
`Resize`	Occurs when the user resizes a chart.
`Select`	Occurs when the user selects a chart element.
`SeriesChange`	Occurs when the user changes the value of a chart data point.

Worksheet Events

Excel associates worksheet-level events with the currently selected worksheet. Event-handling procedures related to a worksheet should be in the standard module for the worksheet object. The following table lists the worksheet events.

EVENT	WHEN THE EVENT OCCURS
`Activate`	Occurs when Excel activates a worksheet.
`BeforeDoubleClick`	Occurs when the user double-clicks a worksheet.
`BeforeRightClick`	Occurs when the user right-clicks a worksheet.
`Calculate`	Occurs after Excel calculates a worksheet.
`Change`	Occurs when a user or external link modifies cells on a worksheet. See the section "Monitor a Range of Cells for Changes."
`Deactivate`	Occurs when Excel deactivates a worksheet.
`FollowHyperlink`	Occurs when a user clicks a hyperlink on a worksheet.
`PivotTableUpdate`	Occurs after a PivotTable report is updated on a worksheet.
`SelectionChange`	Occurs when a selection changes on a worksheet.

Application Events

Application events include all events recognized by the Application object. To access an application event, create a class module to contain your application event-handling procedure code. See the section "Run a Procedure When Excel Creates a Workbook" for more information on placing event-handling code in a class module. The following table lists the application-level events that occur in Excel.

EVENT TYPE	DESCRIPTION
`Application`	An event that occurs for the application. For example, Excel triggers the `NewWorkbook` event when it creates a new workbook.
`NewWorkbook`	Occurs when Excel creates a new workbook. See the section "Run a Procedure When Excel Creates a Workbook."
`SheetActivate`	Occurs when Excel activates any sheet in any workbook.
`SheetBeforeDoubleClick`	Occurs when the user double-clicks any sheet.
`SheetBeforeRightClick`	Occurs when the user right-clicks any sheet.
`SheetCalculate`	Occurs when Excel calculates any worksheet.
`SheetChange`	Occurs when cells on a worksheet are changed by a user or an external link.
`SheetFollowHyperlink`	Occurs when a user clicks a hyperlink on a sheet.
`SheetPivotTableUpdate`	Occurs when Excel updates a worksheet of a PivotTable report.
`SheetSelectionChange`	Occurs when the selection changes on any worksheet.
`WindowActivate`	Occurs when Excel activates a worksheet window.
`WindowDeactivate`	Occurs when Excel deactivates a worksheet window.
`WindowResize`	Occurs when the user resizes a worksheet window.
`WorkbookActivate`	Occurs when the user activates a workbook.
`WorkbookAddInInstall`	Occurs when an add-in installs a workbook.
`WorkbookAddInUninstall`	Occurs when an add-in uninstalls a workbook.
`WorkbookBeforePrint`	Occurs when Excel prints an open workbook.
`WorkbookBeforeSave`	Occurs when Excel saves an open workbook.
`WorkbookDeactivate`	Occurs when Excel deactivates a workbook.
`WorkbookNewSheet`	Occurs when Excel adds a new sheet to an open workbook.
`WorkbookOpen`	Occurs when Excel opens a workbook.
`WorkbookPivotTableCloseConnection`	Occurs after a PivotTable report closes the data source connection.
`WorkbookPivotTableOpenConnection`	Occurs after a PivotTable report opens the data source connection.

Run a Procedure as a Workbook Opens

You can create a procedure that runs automatically each time a particular workbook opens. Because this type of procedure executes only when the workbook opens, it works well for opening other workbooks, determining if specific conditions are met, and displaying welcome messages. The procedure executes when the workbook opens by using the `Workbook_Open` event, which is triggered by the opening workbook.

To create a procedure that executes when a workbook opens, create a new procedure and add it to the `ThisWorkbook` object standard module for the workbook. All event-handling procedures for monitoring workbook events must reside in the `ThisWorkbook` object if you want Excel to execute them automatically. To create a procedure that executes when a workbook opens, name the procedure `Workbook_Open`.

Although the procedure resides in the `ThisWorkbook` object standard module, it can access other procedures in the same workbook. Therefore, you can create a `Workbook_Open` procedure that calls procedures in other modules.

If you want a procedure to execute whenever Excel opens, place the procedure in the `ThisWorkbook` object for the Personal Macro Workbook – Personal.xlsb. Because the Personal Macro Workbook always loads as a hidden workbook in Excel, any procedures in this workbook execute when Excel opens. Keep in mind, however, that Excel associates the Personal Macro Workbook with an individual user.

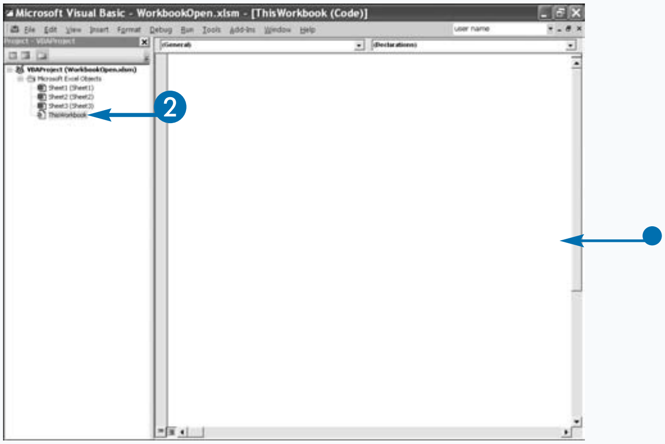
You can keep a `Workbook_Open` procedure from executing for a particular workbook by holding down the Shift key as the workbook opens. Because workbooks open quickly, make sure you press and hold the Shift key as you select the workbook.

Run a Procedure as a Workbook Opens

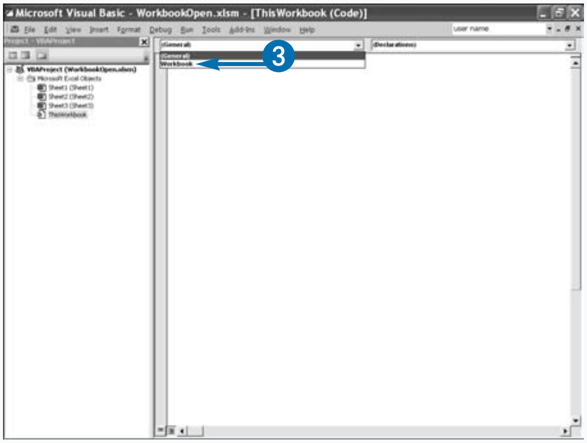
① Open Project Explorer.

② Double-click the `ThisWorkbook` node under the workbook to which you want to add a `Workbook_Open` event.

- The standard module for the `ThisWorkbook` object opens.


Microsoft Visual Basic - WorkbookOpen.xlsm - [ThisWorkbook (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Project - VBAProject
VBAProject (WorkbookOpen.xlsm)
Microsoft Excel Objects
Sheet1 (Sheet1)
Sheet2 (Sheet2)
Sheet3 (Sheet3)
ThisWorkbook
(General)
(Declarations)
2

③ Click here and select the Workbook option.


Microsoft Visual Basic - WorkbookOpen.xlsm - [ThisWorkbook (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Project - VBAProject
VBAProject (WorkbookOpen.xlsm)
Microsoft Excel Objects
Sheet1 (Sheet1)
Sheet2 (Sheet2)
Sheet3 (Sheet3)
ThisWorkbook
(General)
(General)
Workbook
(Declarations)
3

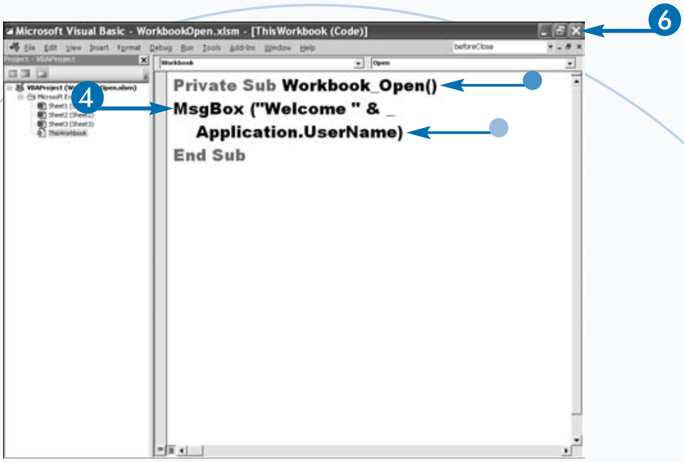
- The Visual Basic Editor creates a Private sub procedure and names it Workbook_Open.

④ Type the VBA code to run when the workbook opens.

- Displays the user's name.

⑤ Press Ctrl+S to save your workbook.

⑥ Close your workbook.

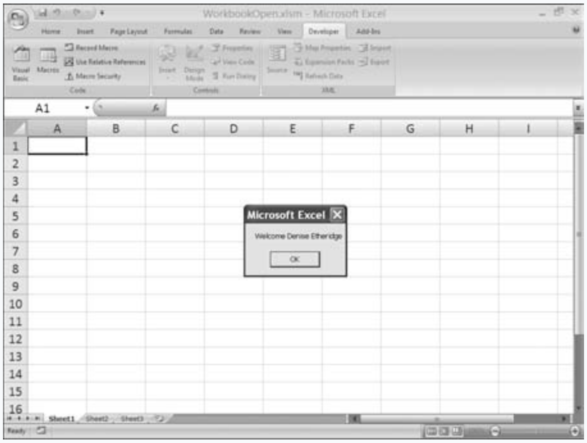

Microsoft Visual Basic - WorkbookOpen.xlsm - [ThisWorkbook (Code)]
Workbook
Open
4
6

```
Private Sub Workbook_Open()
MsgBox ("Welcome " & _
   Application.UserName)
End Sub
```

⑦ Open the workbook you just closed.

The Workbook_Open procedure executes.

In this example, a welcome message appears.



Microsoft Excel

Welcome Denise Etheridge

OK

Extra

You can use the `Workbooks` collection object `Open` method of to specify the workbook that Excel should open along with the current workbook. For example, if your workbook relies on data values in another workbook, you can open the workbook your workbook relies on, whenever your workbook opens. See Chapter 9 for more information on using the `Open` method.

You can use the Object drop-down list in the Code window to create your `Workbook_Open` sub procedure. The Object drop-down list contains the objects for which you can create sub procedures in the current standard module. If you access the ThisWorkbook standard module, the only available object is `Workbook`.

When you select the `Workbook` object from the Objects drop-down list, the VBE automatically creates a private Sub procedure called `Workbook_Open` because the default event for the `Workbook` object is the `Open` event.

Run a Procedure before Closing a Workbook

You can create a `BeforeClose` event procedure that runs automatically before a particular workbook closes. If the user has made changes to the workbook, the event executes before Excel asks users if they want to save their changes. Because this type of procedure executes only as the workbook closes, it works well for recalculating, resetting the workbook back to default values, and even automatically saving the workbook.

To produce a procedure that executes when a workbook closes, create a new procedure and add it to the `ThisWorkbook` object standard module for the particular workbook. All event-handling procedures that you create for monitoring workbook events must reside in the `ThisWorkbook` object for Excel to execute them automatically. To create a procedure that executes when a workbook closes, name the procedure `Workbook_BeforeClose`.

Although the procedure resides in the `ThisWorkbook` object standard module, it can access other procedures in the same workbook. Therefore, you can create a `Workbook_BeforeClose` procedure that calls procedures in another module.

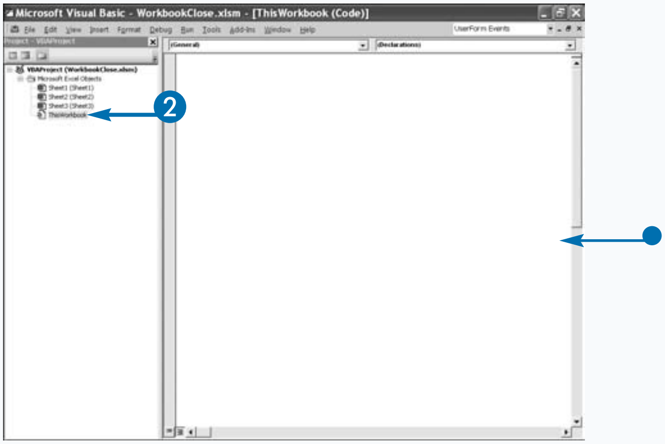
The `BeforeClose` event has one parameter, `Cancel`. You can use the Cancel parameter to change what Excel does after the `BeforeClose` event completes. If the `Cancel` parameter has a value of `False`, which is the default, the workbook closes normally. If your procedure sets the value of the `Cancel` parameter to `True`, Excel cancels the closing process and does not close the workbook. You can set the `Cancel` parameter to `True` and then prompt the user for additional information before closing.

Run a Procedure before Closing a Workbook

① Open Project Explorer.

② Double-click the `ThisWorkbook` node under the workbook to which you want to add a `Workbook_Open` event.

- The standard module for the `ThisWorkbook` object opens.

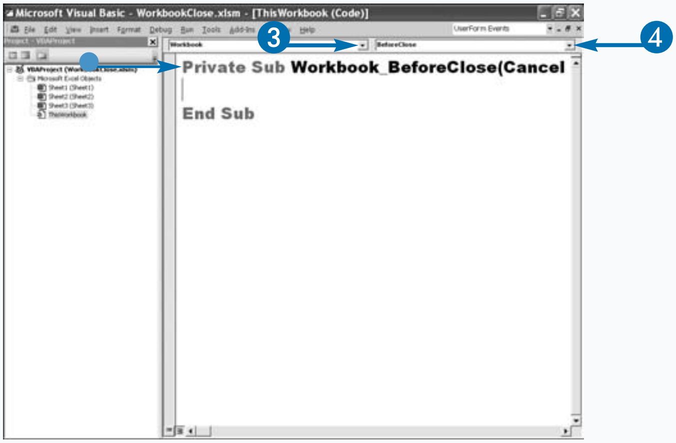

Microsoft Visual Basic - WorkbookClose.xlsm - [ThisWorkbook (Code)]
2

③ Click here and select Workbook.

④ Click here and select BeforeClose

- The Visual Basic Editor creates a new Private Sub procedure named Workbook_BeforeClose.

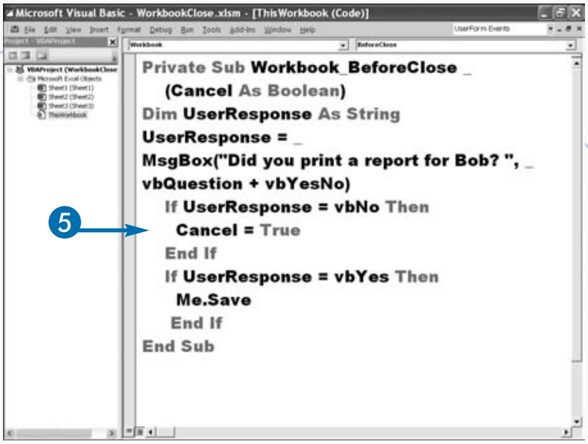
Delete the `Workbook_Open` Sub procedure if it appears.


Microsoft Visual Basic - WorkbookClose.xlsm - [ThisWorkbook (Code)]
3
4
Workbook
BeforeClose

```
Private Sub Workbook_BeforeClose(Cancel

End Sub
```

⑤ Type the VBA code that will run before the workbook closes.

⑥ Close the workbook.

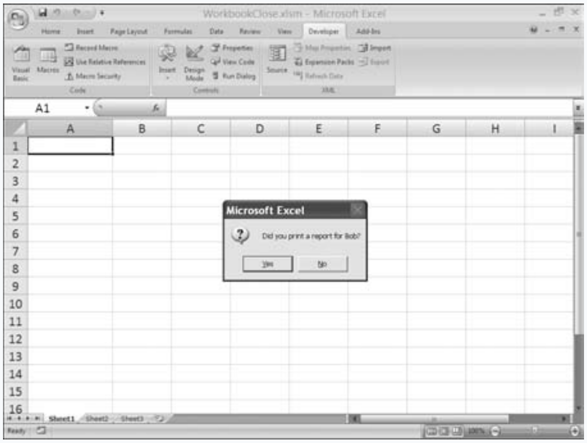


Microsoft Visual Basic - WorkbookClose.xlsm - [ThisWorkbook (Code)]
Workbook
BeforeClose
5

```
Private Sub Workbook_BeforeClose _
    (Cancel As Boolean)
Dim UserResponse As String
UserResponse = _
MsgBox("Did you print a report for Bob? ", _
vbQuestion + vbYesNo)
    If UserResponse = vbNo Then
      Cancel = True
    End If
    If UserResponse = vbYes Then
      Me.Save
     End If
End Sub
```

The `Workbook_BeforeClose` procedure executes.

In this example, Excel asks if you printed a report.



Did you print a report for Bob?

Extra

You can use the `Me` operator in standard modules for Excel objects. The `Me` operator references the object associated with the module. For example, code created in the `ThisWorkbook` object module links to the actual workbook object. When you use the `Me` operator, you reference the workbook object. Therefore, when you add the code `Me.Close` to a module, Excel closes the workbook. The code `Me.Close` is equivalent to using the `ThisWorkbook` object reference. You cannot use `Me` in a standard module. You can use the `Me` operator when working with UserForm modules. When used with a user form, the `Me` operator references the corresponding UserForm and not the controls that you have added to the UserForm.

If your procedure has made a change that affects all workbooks, you can use a `BeforeClose` event procedure to undo the change before the workbook closes. For example, if you have a procedure that loads an add-in, you can use the `BeforeClose` event procedure to unload the add-in before the workbook closes.

Run a Procedure before Saving a Workbook

You can create a `BeforeSave` event procedure that runs automatically before Excel saves a workbook. By creating a `BeforeSave` procedure, you can customize the save process. For example, when users select the Save or SaveAs option, you may want to ask if they have performed all required tasks.

To create a procedure that executes before saving a workbook, create a new procedure using the `BeforeSave` event and add it to the `ThisWorkbook` object standard module for the particular workbook. All event-handling procedures that you create for monitoring workbook events must reside in the `ThisWorkbook` object to have Excel execute them automatically. To create a procedure that executes before Excel saves the workbook, you name the procedure `Workbook_BeforeSave`.

Although the procedure resides in the `ThisWorkbook` object standard module, it can access other procedures in the same workbook. Therefore, you can create a `Workbook_BeforeSave` procedure that calls procedures in another module in the same workbook.

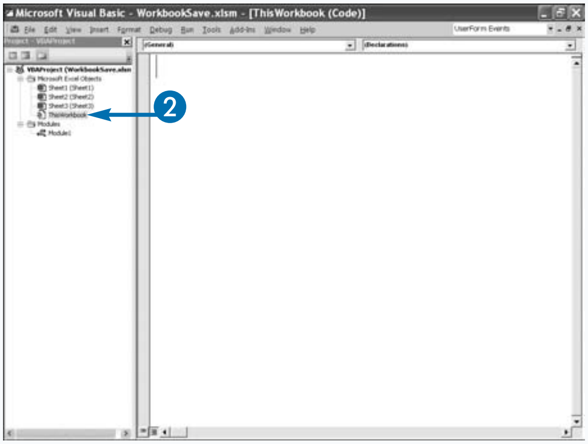
The `BeforeSave` event has two parameters that VBA passes to your procedure when the event triggers — `SaveAsUI` and `Cancel`. Use the `SaveAsUI` parameter to indicate whether the Save As dialog box displays during the Save command. Set the value of the `SaveUI` parameter to `True` to always display the Save As dialog box. Use the `Cancel` parameter to indicate whether the workbook saves. If the `Cancel` parameter has a value of `False`, Excel saves the workbook. The default value is `False`. If you set the value of the `Cancel` parameter to `True`, Excel does not save the workbook. From within the `Workbook_BeforeSave` procedure, you can set the value of the `Cancel` parameter to specify whether the workbook actually saves.

Run a Procedure before Saving a Workbook

① Open Project Explorer.

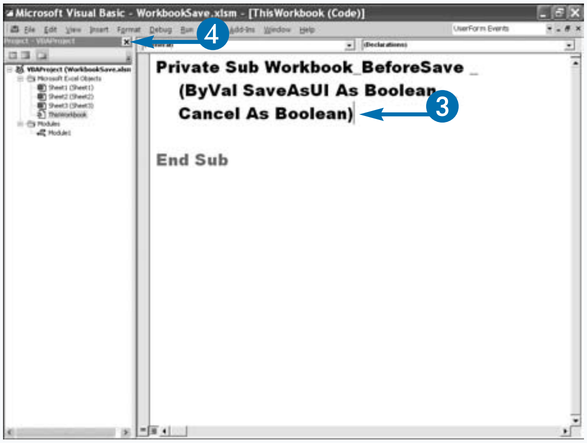
② Double-click the `ThisWorkbook` node under the workbook to which you want to add a `Workbook_Open` event.

The module for the `ThisWorkbook` object opens.


Microsoft Visual Basic - WorkbookSave.xlsm - [ThisWorkbook (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
UserForm Events
Project - VBAProject
(General)
(Declarations)
VBAProject (WorkbookSave.xlsm)
Microsoft Excel Objects
Sheet1 (Sheet1)
Sheet2 (Sheet2)
Sheet3 (Sheet3)
ThisWorkbook
Modules
Module1
2

③ Create a Private `Workbook_BerforeSave` Sub procedure.

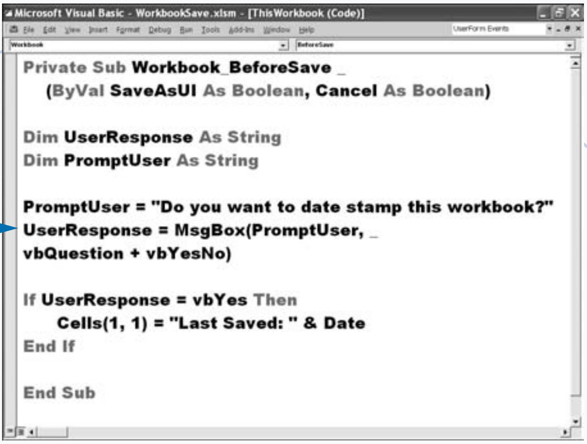
④ Click the Close button to close Project Explorer.


Microsoft Visual Basic - WorkbookSave.xlsm - [ThisWorkbook (Code)]
File Edit View Insert Format Debug Run Add-Ins Window Help
UserForm Events
Project - VBAProject
(Declarations)
VBAProject (WorkbookSave.xlsm)
Microsoft Excel Objects
Sheet1 (Sheet1)
Sheet2 (Sheet2)
Sheet3 (Sheet3)
ThisWorkbook
Modules
Module1
4
3

```
Private Sub Workbook_BeforeSave _
   (ByVal SaveAsUI As Boolean
   Cancel As Boolean)

End Sub
```

⑤ Type the VBA code that will run when the workbook saves.

⑥ Press Alt+F11 to switch from the VBE to Excel.

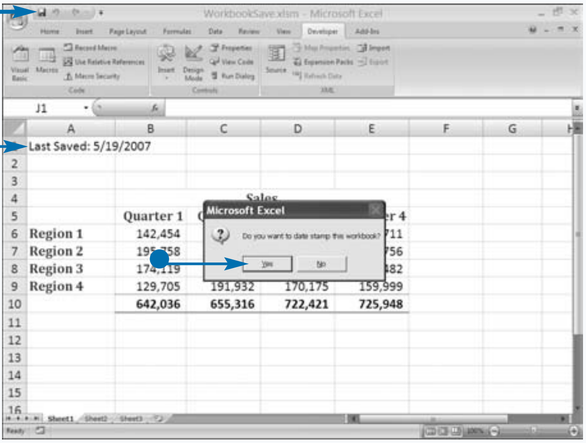

Microsoft Visual Basic - WorkbookSave.xlsm - [ThisWorkbook (Code)]
Workbook
BeforeSave
5

```
Private Sub Workbook_BeforeSave _
    (ByVal SaveAsUI As Boolean, Cancel As Boolean)

Dim UserResponse As String
Dim PromptUser As String

PromptUser = "Do you want to date stamp this workbook?"
UserResponse = MsgBox(PromptUser, _
vbQuestion + vbYesNo)

If UserResponse = vbYes Then
    Cells(1, 1) = "Last Saved: " & Date
End If

End Sub
```

⑦ Click the Save button to save the workbook.

The `Workbook_BeforeSave` procedure executes.

- In this example, the procedure prompts you, "Do you want to date stamp this workbook?"
- Click Yes if you want to date stamp your file.


7
WorkbookSave.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
J1
Sales
Quarter 1
Region 1
Region 2
Region 3
Region 4
142,454
195,758
174,119
129,705
191,932
170,175
159,999
642,036
655,316
722,421
725,948
Microsoft Excel
Yes
No
Sheet1
Sheet2
Sheet3
Ready

Last Saved: 5/19/2007

Do you want to date stamp this workbook?

Extra

When you want to make sure that a variable in a procedure does not change the value of variables in other procedures, use the `ByVal` keyword. VBA uses the `ByVal` keyword. For example, the `Workbook_BeforeSave` Sub procedure includes a `ByVal`, `SaveAsUI` parameter. To aid in your understanding of `ByVal`, consider the following example, where the message box displays a value 10 because the value of `TestVal` in the `Test2` Sub procedure is `ByVal`. Any changes to `TestVal` in the `Test2` Sub procedure do not pass back to `Test1`.

Example:

```
Sub Test1()
      Dim TestVal As Integer
      TestVal = 10
      Call Test2(TestVal)
      MsgBox TestVal
End Sub

Sub Test2(ByVal TestVal)
      TestVal = 2598
End Sub
```

Run a Procedure When Excel Creates a Workbook

If you have settings you apply to every workbook, you can use the `NewWorkbook` application event to set those setting every time you open a workbook. For example, when you open an Excel workbook, by default it contains three worksheets. If you always need five worksheets, you can create a `NewWorkbook` application event to create two additional worksheets.

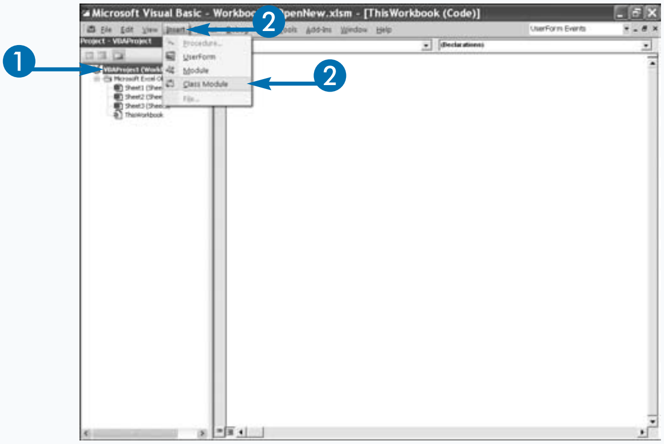
The `NewWorkbook` application event executes a procedure whenever Excel opens a new workbook. The application triggers the `NewWorkbook` event. Because the event comes from the application and not from an individual object such as a workbook or chart, the process of creating an application event is a little more complex.

When working with application events, first create a class module. Excel only makes code in a standard module available to other modules in the same project or workbook. When you create a procedure for an application event, you want all open projects to be able to access the code; therefore, you need to use a class module.

Because Excel does not recognize your application event code until the workbook containing the code opens, open the workbook containing the code first. You may want to consider adding the code to the Personal.xlsb workbook. The Personal.xlsb workbook opens whenever you open Excel, so the application event code activates as the workbook opens. See Chapter 1 for more information about the Personal Macro workbook.

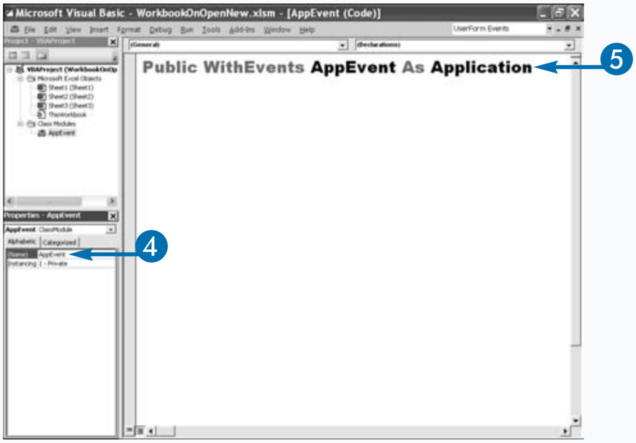
In the class module, declare an event custom object by using the `WithEvents` keyword. The `WithEvents` keyword instructs Excel to notify you whenever the Application object triggers a `NewWorkbook` event. Use the `Public` keyword because you want all open projects to access this object variable. See Chapter 3 for more information on using the `Public` keyword.

Run a Procedure When Excel Creates a Workbook


Microsoft Visual Basic - Workbo
penNew.xlsm - [ThisWorkbook (Code)]
Procedure...
UserForm
Module
Class Module
File...
1
2
2

1. Click the workbook in which you want to add a `NewWorkbook` event.
2. Click Insert ➔ Class Module.

   VBA creates a blank class module.
3. Press F4.

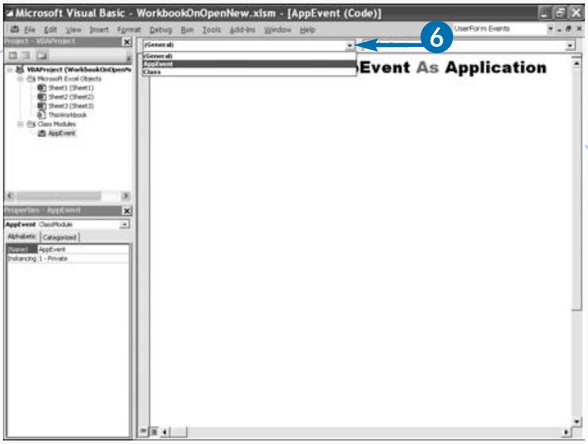

Microsoft Visual Basic - WorkbookOnOpenNew.xlsm - [AppEvent (Code)]
(General)
(Declarations)
Properties - AppEvent
(Name)
AppEvent
Instancing
1 - Private
4
5

```
Public WithEvents AppEvent As Application
```

The Properties window opens.

4. Type a Name for your class module in the Name field.
5. Declare a public Application object using the `WithEvents` keyword.

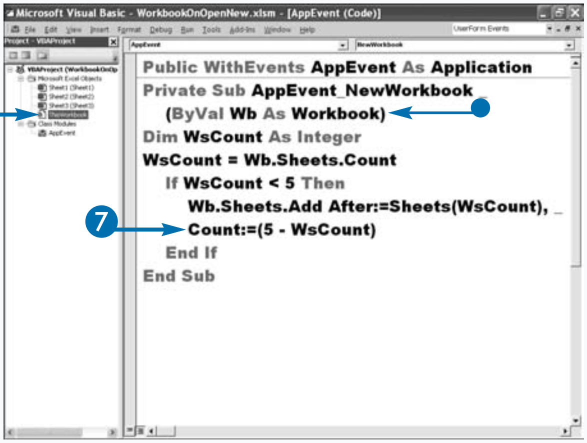
6. Click here and select the name you typed in step 5.


Microsoft Visual Basic - WorkbookOnOpenNew.xlsm - [AppEvent (Code)]
(General)
AppEvent
Class
6

```
Event As Application
```

- VBA creates a Private `AppEvent_NewWorkbook` Sub procedure.

7. Type the code you want to execute when a new workbook opens.
8. In Project Explorer, double-click the `ThisWorkbook` node.


Microsoft Visual Basic - WorkbookOnOpenNew.xlsm - [AppEvent (Code)]
AppEvent
NewWorkbook
8
7

```
Public WithEvents AppEvent As Application
Private Sub AppEvent_NewWorkbook _
  (ByVal Wb As Workbook)
Dim WsCount As Integer
WsCount = Wb.Sheets.Count
  If WsCount < 5 Then
    Wb.Sheets.Add After:=Sheets(WsCount), _
    Count:=(5 - WsCount)
  End If
End Sub
```

Extra

When you use the `WithEvents` keyword to declare a public Application object, the VBE creates a new object and adds it to the Object drop-down list. When you select this object, the Procedure box contains a list of all corresponding application events. To create a new event procedure, select the object from the Object drop-down list and the appropriate event from the Procedure drop-down list. The VBE creates a new Sub procedure with the appropriate arguments. For example, if your object is `AppEvent` and you select the `WindowActivate` event, the Editor adds the following code to the class module:

Example:

```
Private Sub AppEvent_WindowActivate(ByVal Wb As Workbook, ByVal Wn As Window)
```

You can use the Object Browser to find out more about a particular event by pressing F2 while in the VBE. Type the event you want to know about and click Search. The Object Browser displays a list of matching items. Excel indicates the Events with a small lightning bolt. If you click an event, the event syntax displays at the bottom of the Object Browser window.

continued

Run a Procedure When Excel Creates a Workbook (continued)

After you declare an event custom object by using the `WithEvents` keyword, use the `NewWorkbook` event to specify that the event executes when Excel creates a new workbook. The `NewWorkbook` event has one parameter, `Wb`, which passes into the Sub procedure. The `Wb` parameter contains the newly created workbook. You can access any of the methods and properties of the new workbook by using the `Wb` parameter. For example, you can use the `Name` property to return the name of the new workbook. See Chapter 9 for more information on working with the `Workbook` object.

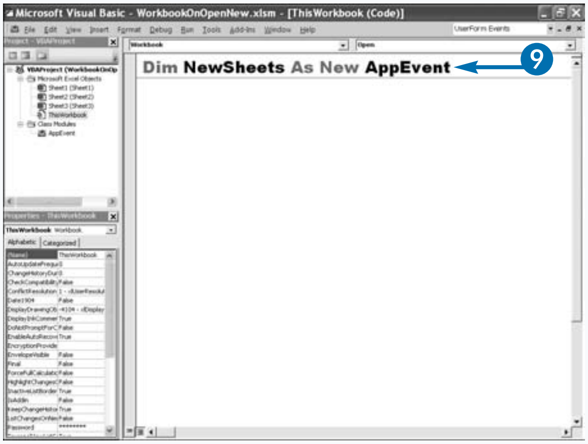
Creating the `NewWorkbook` Sub procedure in the class module defines the code to run for the event but does not activate the code. To activate the Sub procedure, add code to a `Workbook_Open` procedure that activates the `Application` event procedure. Because the `Application` event code is meant to work with all events generated by the application, you want to add a class module and the activation code in a workbook you open frequently, such as the Personal Macro workbook. See Chapter 1 to learn more about the personal macro workbook.

To activate the class module code, the module containing the activation procedure must contain a `Dim` statement, which declares an object of the type defined in the class module. Place the `Dim` statement at the top of the standard module. For example, `Dim NewSheets As New AppEvent` creates a new object variable of the type created in the class module. In a procedure, a `Set` statement actually activates the event. To make the Set statement execute automatically, place the `Set` statement in the `Workbook_Open` procedure.

Run a Procedure When Excel Creates a Workbook *(continued)*

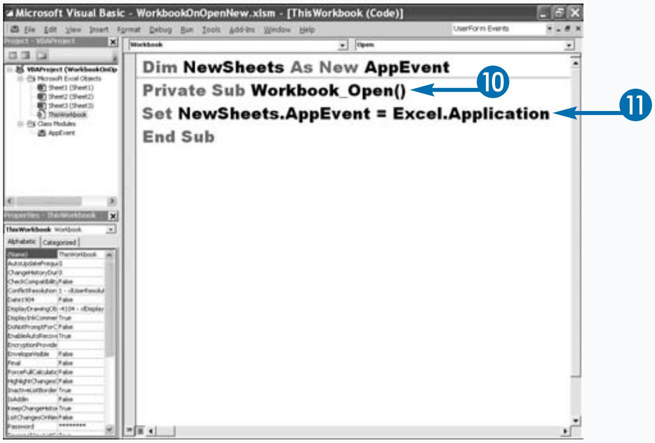
The standard module opens for the `ThisWorkbook` object.

9. Declare an object variable using the `Application` object you created.


Microsoft Visual Basic - WorkbookOnOpenNew.xlsm - [ThisWorkbook (Code)]
Workbook
Open
9

```
Dim NewSheets As New AppEvent
```

10. Create a private `Workbook_Open` Sub procedure.
11. Use a `Set` statement to activate your event.
12. Close and reopen Excel.

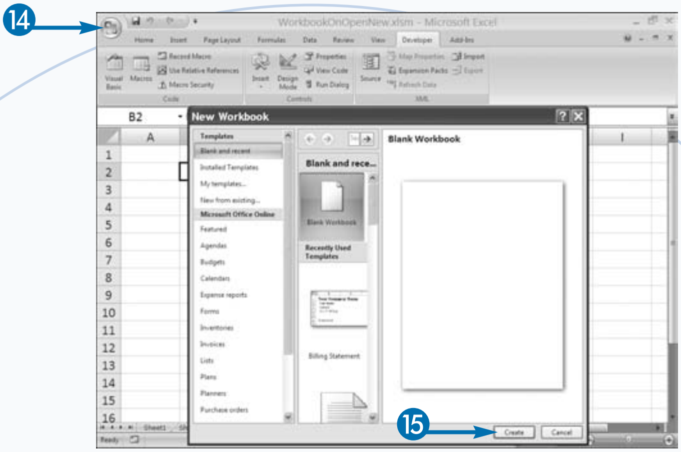

Microsoft Visual Basic - WorkbookOnOpenNew.xlsm - [ThisWorkbook (Code)]
Workbook
Open
10
11

```
Dim NewSheets As New AppEvent
Private Sub Workbook_Open()
Set NewSheets.AppEvent = Excel.Application
End Sub
```

⑬ Open the workbook containing the `Workbook_open` Sub procedure.

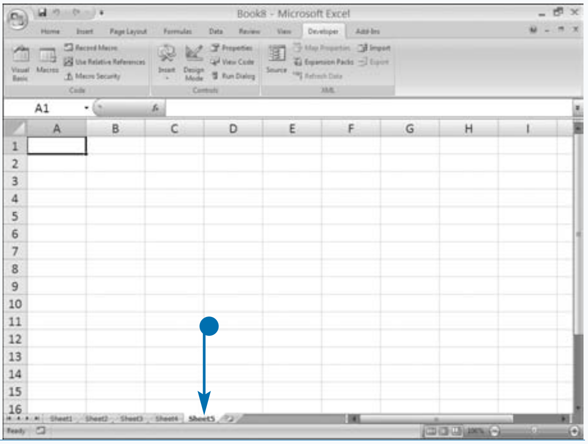
⑭ Click the Office button and then click New.

⑮ Click Create.


⑭
WorkbookOnOpenNew.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
B2
New Workbook
Templates
Blank and recent
Installed Templates
My templates...
New from existing...
Microsoft Office Online
Featured
Agendas
Budgets
Calendars
Expense reports
Forms
Inventories
Invoices
Lists
Plans
Planners
Purchase orders
Blank and rece...
Blank Workbook
Recently Used Templates
Billing Statement
Blank Workbook
⑮
Create
Cancel
Ready

The event-handling procedure executes the code.

- In this example, the procedure adds two sheets to the new workbook.


Book8 - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
A1
A
B
C
D
E
F
G
H
I
Sheet1
Sheet2
Sheet3
Sheet4
Sheet5
Ready

Apply It

When you open the workbook containing the code that activates the application event, the code executes each time you trigger the event. You may find circumstances where you need to deactivate an event so that it no longer triggers. You can create a separate Sub procedure that you can call from within Excel at any point to cancel an event. Essentially, you set the property of the application object to `Nothing`, as shown in the following example:

TYPE THIS:

```
Sub CancelEvent()
Set OpenAppEvent.AppEvent = Nothing
End Sub
```

RESULT:

The code cancels the event for the current session of Excel. The next time you start Excel, the event is reactivated. Creating this type of Sub procedure so you can disable an event-handling procedure at any time is a good idea. You can also set the `EnableEvents` property to `False` for the `Application` object, as shown in this code:

TYPE THIS:

```
Sub CancelEvents()
Application.EnableEvents = False
End Sub
```

RESULT:

This code disables all event-handling procedures for the current session of Excel. The next time you start Excel, the event-handling procedures are reactivated.

Execute a Procedure at a Specific Time

You can create a procedure that executes at a specific time by using the `OnTime` event. For example, you can create a `MsgBox`, which reminds the user of an event 5 minutes before the event starts. Unlike most other events, the `OnTime` event is not associated with a specific object. You must access this event by using the `OnTime` method with the `Application` object.

The `OnTime` method has four parameters; only the first two are required: `EarliestTime`, `Procedure`, `LatestTime`, and `Schedule`. Use the `EarliestTime` parameter to specify the time at which the procedure executes. Use the Excel time-numbering system. Use the `Procedure` parameter to indicate the procedure to execute at the specified time. Enclose the procedure name in quotes.

Use the optional `LatestTime` parameter to indicate the latest time when the procedure can run. If the procedure has not run by the time specified by this parameter, it will not run. The other optional parameter, `Schedule`, has a default value of `True` to schedule the `OnTime` procedure to run again at the specified time or `False` to clear a previously set procedure.

Because the `OnTime` event is not associated with a specific object, you can place a procedure containing the method for accessing the event in any standard module. If you place the `OnTime` method procedure in a standard module, you must run that module to activate the `OnTime` event code. You can also place the `OnTime` method in the `Workbook_Open` procedure so that the event code loads as the workbook opens. See the section "Run a Procedure as a Workbook Opens" for more information.

When using the `OnTime` event, you can use Excel's time-numbering system or you can use VBA's `TimeValue` function. Using VBA's `TimeValue` function simplifies the process.

Execute a Procedure at a Specific Time

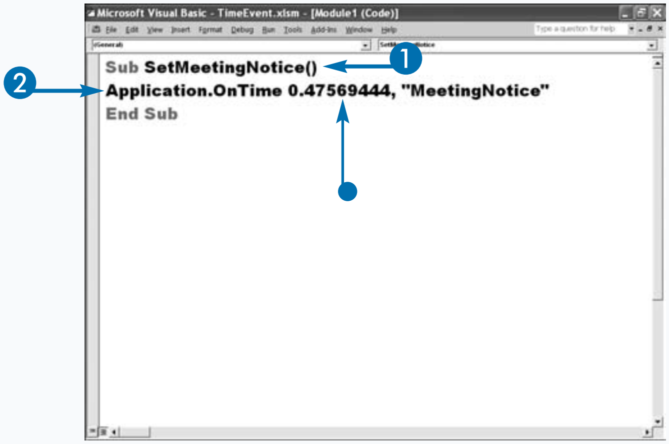
CREATE AN ONTIME EVENT USING EXCEL'S TIME-NUMBERING SYSTEM

① Name your procedure.

② Create an `OnTime` event.

- This is the time the procedure will execute.

  This will execute a procedure at 11:25 AM.


Microsoft Visual Basic - TimeEvent.xlsm - [Module1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Type a question for help
(General)
1
2

```
Sub SetMeetingNotice()
Application.OnTime 0.47569444, "MeetingNotice"
End Sub
```

CREATE AN ONTIME EVENT USING VBA'S TIMEVALUE FUNCTION

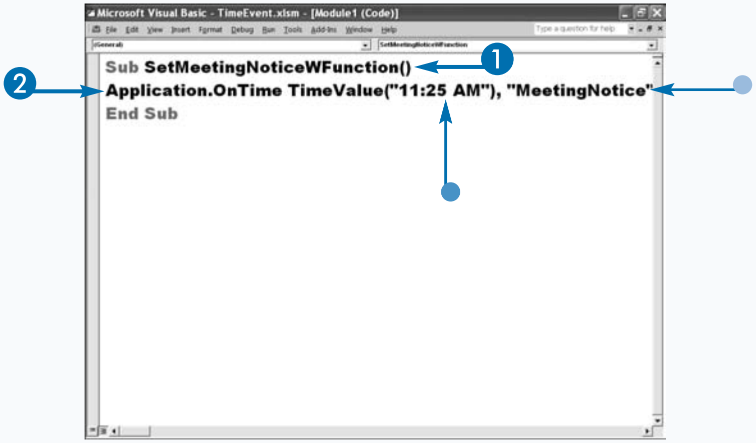
① Name your procedure.

② Create an `OnTime` event.

- This is the time the procedure will execute.

  This will execute a procedure at 11:25 AM.

- This is the procedure that will execute.


Microsoft Visual Basic - TimeEvent.xlsm - [Module1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Type a question for help
(General)
SetMeetingNoticeWFunction
1
2

```
Sub SetMeetingNoticeWFunction()
Application.OnTime TimeValue("11:25 AM"), "MeetingNotice"
End Sub
```

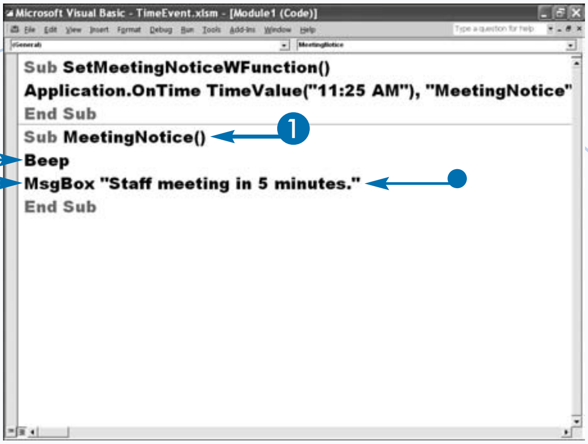
CREATE A PROCEDURE

① Name your procedure.

② Type the code that you want to execute.

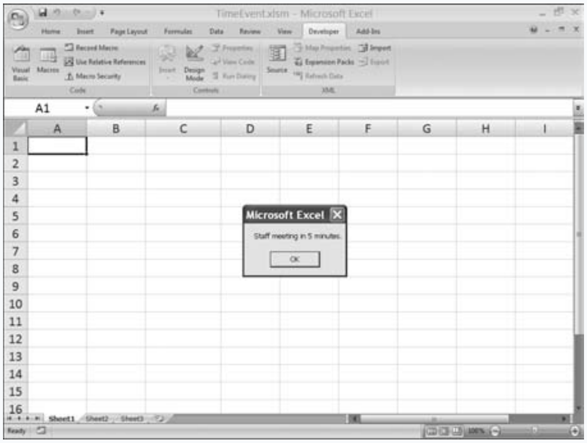
- This causes the computer to beep.
- This displays a message box.

③ Press Alt+F11 to switch from the VBE to Excel and run the macro.


Microsoft Visual Basic - TimeEvent.xlsm - [Module1 (Code)]
(General)
MeetingNotice
1
2

```
Sub SetMeetingNoticeWFunction()
Application.OnTime TimeValue("11:25 AM"), "MeetingNotice"
End Sub
Sub MeetingNotice()
Beep
MsgBox "Staff meeting in 5 minutes."
End Sub
```

Excel executes the procedure at the designated time.


TimeEvent.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
A1
Sheet1
Sheet2
Sheet3
Ready
Microsoft Excel
OK

Staff meeting in 5 minutes.

Extra

The `EarliestTime` and `LatestTime` parameters expect time values based on Excel's time-numbering system, which stores all times as decimal values ranging from 0.0 to 0.99999999. For example, Excel stores 12:00 noon as 0.5 and 6:00 PM as 0.75. Because fractional times can be overwhelming, VBA provides the `TimeValue` function with which you can convert a standard time into the decimal equivalent required. To use the `TimeValue` function, enclose the time you want to convert in quotes. For example, `TimeValue("5:45 PM")` converts 5:45 PM to the appropriate decimal value.

Another useful VBA time function is the `Now` function, which returns the current date and time. When you use the `Now` function in combination with a `TimeValue` function, you can specify how long before an event occurs. For example, to have an event take place in 30 minutes, express the time as follows:

Example:

```
Now + TimeValue("00:30:00")
```

Execute a Procedure When You Press Keys

You can use the `OnKey` event to create a procedure that executes when you press a specific key or combination of keys. For example, you can press Alt+S to sign and date a worksheet. To do this, you define the keys you want to use to execute an event. If you specify a key combination that Excel already uses, your new definition overrides the Excel combination.

Unlike most other events, the `OnKey` event is not associated with a specific object. For that reason, you access this event by using the `OnKey` method with the `Application` object.

The `OnKey` method has two parameters, `Key` and `Procedure`. Use the `Key` parameter to specify the key combination, which you express as a string consisting of the combined keys you capture. Represent standard keys, such as *a* and *5*, by simply typing the character for the key. Specify nonstandard keys, such as `Delete` and `Insert`, by placing the key name in curly braces: `{DELETE}` or `{INSERT}`.

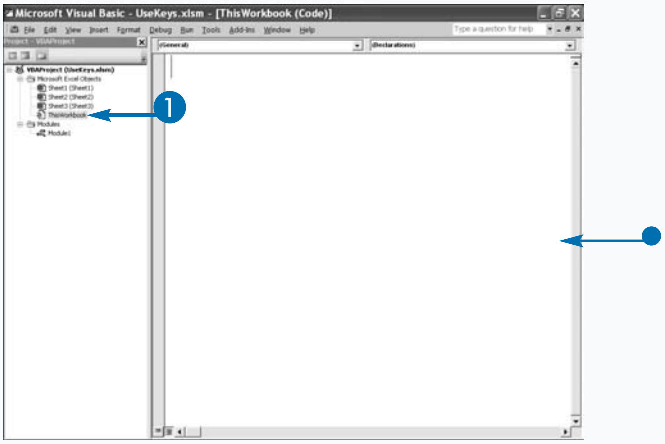
Use the `Procedure` parameter to indicate the name of the procedure to execute. Enclose the procedure name in quotes.

Because the `OnKey` event is not associated with a specific object, you can place your procedure containing the method for accessing the event in any standard module. However, if you place the `OnKey` method procedure in a standard module, you need to run the macro to activate the code. You can place the `OnKey` method in the `Workbook_Open` procedure so that it loads as the workbook opens. See the section "Run a Procedure as a Workbook Opens" for more information.

Execute a Procedure When You Press Keys

① Double-click the `ThisWorkbook` node under the workbook to which you want to add a `Workbook_Open` event.

- The module for the `ThisWorkbook` object opens.


Microsoft Visual Basic - UseKeys.xlsm - [ThisWorkbook (Code)]
(General)
(Declarations)
1

② Click here and select the Workbook option.

- The Visual Basic Editor creates a `Private` Sub procedure and names it `Workbook_Open`.

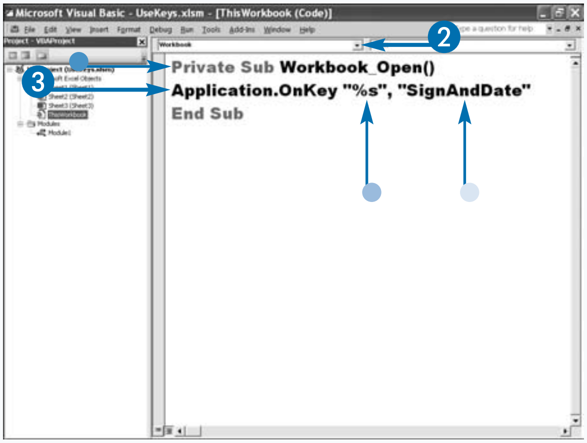
Note: *See the section "Run a Procedure as a Workbook Opens" for information on the* `Workbook_Open` *procedure.*

③ Create your `OnKey` command.

- This is the Alt key.

See the Extra section of this task for more information.

- This is the name of the procedure you want to run.

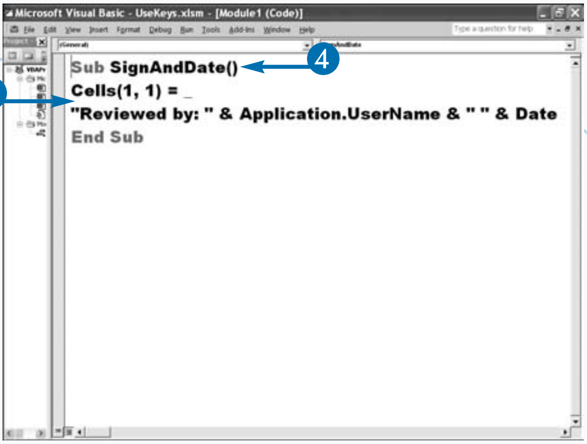

Microsoft Visual Basic - UseKeys.xlsm - [ThisWorkbook (Code)]
Workbook
2
3

```
Private Sub Workbook_Open()
Application.OnKey "%s", "SignAndDate"
End Sub
```

4. Create a Sub procedure with the same name you specified in step 3.

5. Type the code that you want to execute.

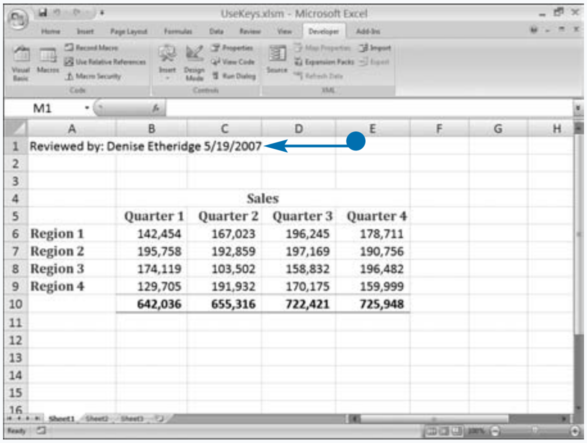
6. Press Alt+F11 to switch from the VBE to Excel and run the macro.


Microsoft Visual Basic - UseKeys.xlsm - [Module1 (Code)]
(General)
SignAndDate
4
5

```
Sub SignAndDate()
Cells(1, 1) = _
"Reviewed by: " & Application.UserName & " " & Date
End Sub
```

When you press the designated keys. Excel executes the macro.

In this example, Excel places the user name and the date in cell A1.


UseKeys.xlsm - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
M1
Sheet1
Sheet2
Sheet3
Ready

	A	B	C	D	E
1	Reviewed by: Denise Etheridge 5/19/2007				
2					
3					
4			Sales		
5		Quarter 1	Quarter 2	Quarter 3	Quarter 4
6	Region 1	142,454	167,023	196,245	178,711
7	Region 2	195,758	192,859	197,169	190,756
8	Region 3	174,119	103,502	158,832	196,482
9	Region 4	129,705	191,932	170,175	159,999
10		642,036	655,316	722,421	725,948

Extra

When specifying keys that do not create a character, such as Delete or Down Arrow, enclose the name of the key in curly braces: {Delete} or {Down}. For some keys, Excel provides special characters to represent the key when you combine it with other characters:

CHARACTER	REPRESENTS
+	SHIFT
^	CTRL
%	ALT
~	ENTER

To reassign a particular key combination to its original meaning, omit the `Procedure` parameter:

TYPE THIS:

```
Application.OnKey._ "+^{LEFT}"
```

RESULT:

The custom key combination assignment is removed, and Excel executes the default command for that key combination, if one exists.

To use one of the special characters in your key combination, enclose the character in braces. For example, to specify a procedure to execute when you press the percent sign, type the following code:

TYPE THIS:

```
Application.OnKey "{%}", _
"ExecutePercent"
```

RESULT:

Whenever the user presses %, the `ExecutePercent` procedure executes.

Create an Add-In

With add-ins, you can seamlessly integrate additional functionality into Microsoft Excel. You can create an add-in and distribute it to others. An add-in can contain user-defined functions, custom dialog boxes, Sub procedures, and a custom Ribbon. When you open the Insert Function dialog box, add-in functions appear in the User Defined category. You can select and use them just as you would any other functions. See Chapter 3 to learn more about functions. When you install an add-in, any key combinations you assign to a Sub procedure become available to the user.

You create an add-in by saving a workbook in the add-in format. When you attempt to save a workbook in add-in format, Excel suggests the AddIns folder in your user directory; for example, C:\Documents and Settings*user*\Application Data\Microsoft\AddIns. Saving the file to this folder makes the add-in available to only the current user. To make the add-in available to others, save the file under the Office program in the Library folder. Excel gives Office 2007 add-ins an .xlam extension. After you save a workbook in add-in format, the worksheets in the workbook are no longer visible and users cannot make them visible by using the Unhide command. You can copy and paste information from the add-in workbook to other workbooks, but users cannot see or edit the sheets in the add-in workbook. In addition, the add-in workbook does not become a part of the Workbooks collection.

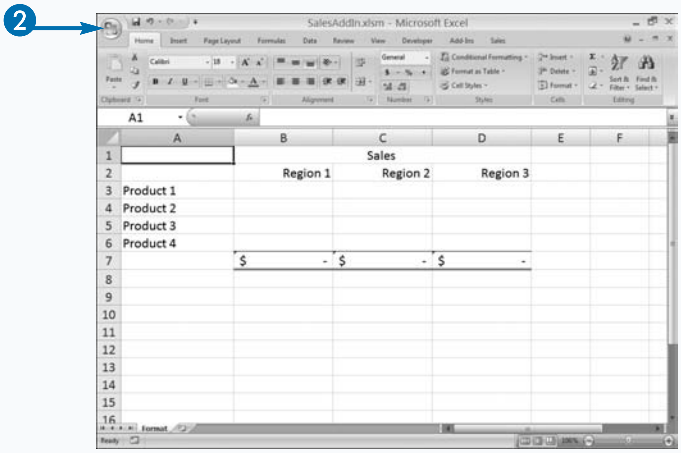
Before you convert a workbook to add-in format, you should thoroughly test it. Simulate how the macro will function by opening another workbook and executing the macros.

Create an Add-in

1. Create the workbook you want to use as an add-in.

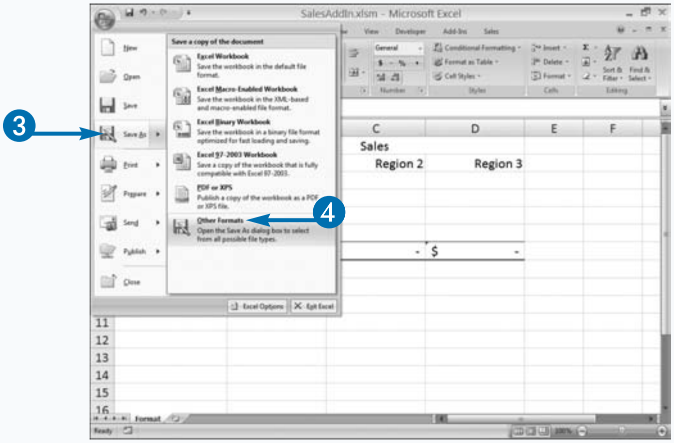
   Make sure it is completely debugged.

2. Click the Office button.


2
SalesAddIn.xlsm - Microsoft Excel
Home Insert Page Layout Formulas Data Review View Developer Add-Ins Sales
A1
Sales
Region 1
Region 2
Region 3
Product 1
Product 2
Product 3
Product 4
$ -
$ -
$ -
Format
Ready

3. Click Save As.

4. Click Other Formats.


3
4
SalesAddIn.xlsm - Microsoft Excel
New
Open
Save
Save As
Print
Prepare
Send
Publish
Close
Save a copy of the document
Excel Workbook
Save the workbook in the default file format.
Excel Macro-Enabled Workbook
Save the workbook in the XML-based and macro-enabled file format.
Excel Binary Workbook
Save the workbook in a binary file format optimized for fast loading and saving.
Excel 97-2003 Workbook
Save a copy of the workbook that is fully compatible with Excel 97-2003.
PDF or XPS
Publish a copy of the workbook as a PDF or XPS file.
Other Formats
Open the Save As dialog box to select from all possible file types.
Excel Options
Exit Excel
Sales
Region 2
Region 3
Format
Ready

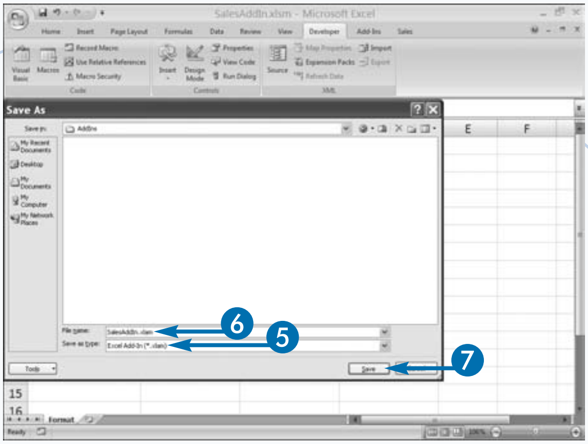
The Save As dialog box appears.

5. Click here and select Excel Add-In (*.xlam).

   Excel moves to the AddIns directory for the user.

6. Type a name for your file.

7. Click Save.

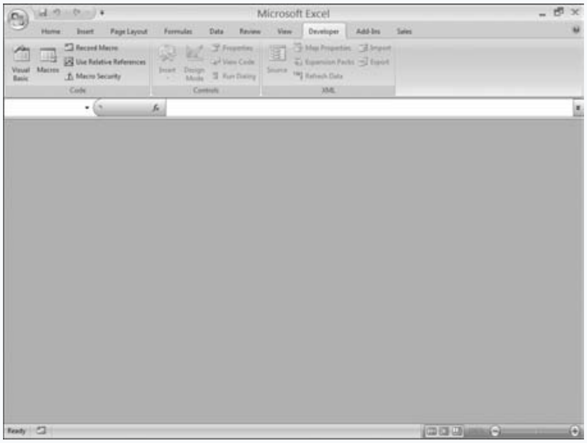


File name: SalesAddIn.xlam

Save as type: Excel Add-In (*.xlam)

Excel creates your add-in.

Note that no worksheets appear in the window.



Extra

To distribute your add-in to others, give them a copy of your XLAM file and tell them the proper directory in which to install it. You should password-protect your file. See the task "Set Add-In Properties" to learn how to password-protect an add-in file. You do not need to distribute copies of your XLSM file.

You can open an add-in file by clicking the Office button, clicking Open, locating the add-in, and then clicking Open. The add-in opens; however, the name of the macro does not appear on the title bar and no worksheet appears. You can open another worksheet and use the add-in. This is a great way to test your macro before making it available to the Add-Ins manager. When you save your add-in to the office library or to a user's AddIns directory, the add-in becomes available in the Add-ins section of the Excel Option dialog box for you to load.

Set Add-in Properties

When you create an add-in, the sheets included in the add-in file are not visible to users; however, if users press F11 or click the Visual Basic button on the Developer tab of the Ribbon, they move to the VBE where they can view and modify your code. If you do not want users to modify your code, you must use the Project Properties dialog box to password-protect your code. Although password protecting provides some level of security, you should be aware that there are products on the market that can recover your password.

Use the General tab of the Project Properties dialog box to name and describe your add-in. The Project Name and description appear at the bottom of the View and Manage Microsoft Office add-ins pane and provide the user with brief introduction to your add-in before installing.

The sheets associated with an add-in workbook are not visible. If you want to view the sheets, open the Properties window in the VBE by pressing F4. If you then click `ThisWorkbook` in the Project Explorer, the properties for the workbook become available. If you set the `IsAddin` property to `False`, the sheets in your workbook become available.

All functions you create in an add-in file are normally available to users through the Insert Function dialog box whenever the add-in is available. If you create functions you intend to only be available to other functions or procedures, use the `Private` keyword when you create them. To learn more about the `Private` keyword, see Chapter 3.

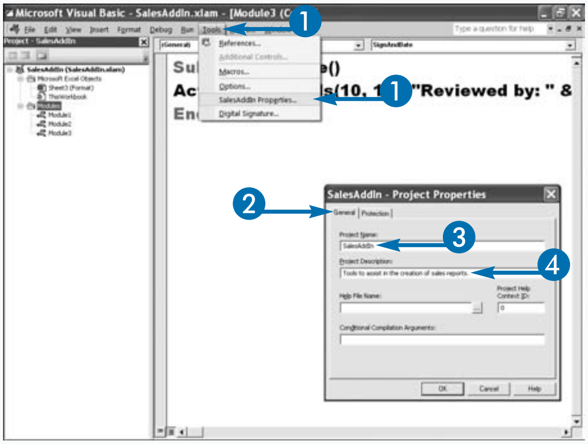
Set Add-in Properties

NAME AND PASSWORD PROTECT

1. Click *Tools* ➔ *Filename Properties*.

   The Project Properties dialog box appears.

2. Click the General tab.
3. Type a project name.
4. Type a project description.


Microsoft Visual Basic - SalesAddIn.xlam - [Module3 (C
References...
Additional Controls...
Macros...
Options...
SalesAddIn Properties...
Digital Signature...
1
1
2
3
4
SalesAddIn - Project Properties
General
Protection
Project Name:
Project Description:
Help File Name:
Project Help Context ID:
Conditional Compilation Arguments:
OK
Cancel
Help

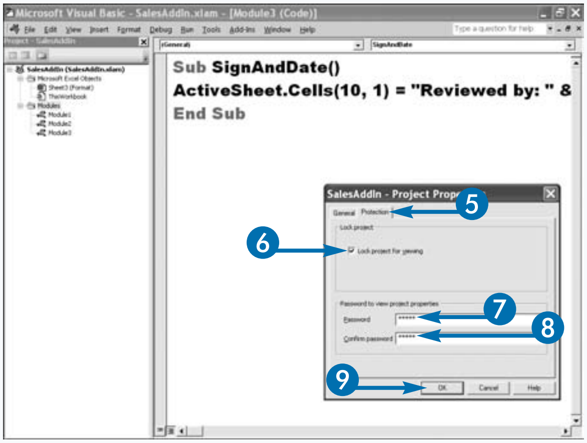
Project Name: SalesAddIn

Project Description: Tools to assist in the creation of sales reports.

Project Help Context ID: 0

5. Click the Protection tab.
6. Select the Lock project for viewing option (☐ changes to ☑).
7. Type a password.
8. Type the password again.
9. Click OK.

   VBA password-protects and adds a name and description to your project.


Microsoft Visual Basic - SalesAddIn.xlam - [Module3 (Code)]
SalesAddIn - Project Prop
General
Protection
Lock project
Lock project for viewing
Password to view project properties
Password
Confirm password
OK
Cancel
Help
5
6
7
8
9

```
Sub SignAndDate()
ActiveSheet.Cells(10, 1) = "Reviewed by: " &
End Sub
```

SET ISADDIN TO FALSE

① Press F4.

Alternatively, click View ➔ Properties Window.

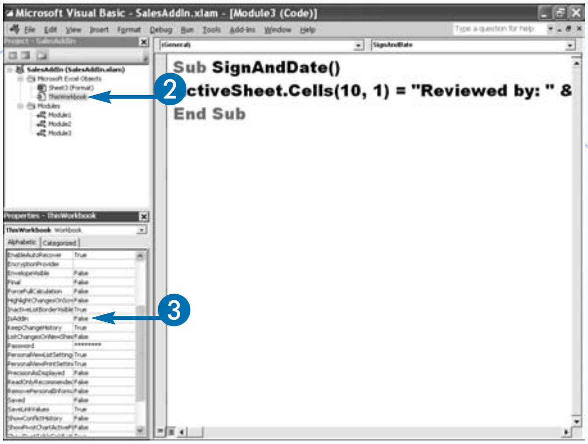
The Properties window appears.

② Click ThisWorkbook.

The workbook properties appear.

③ Set `IsAddin` to `False`.

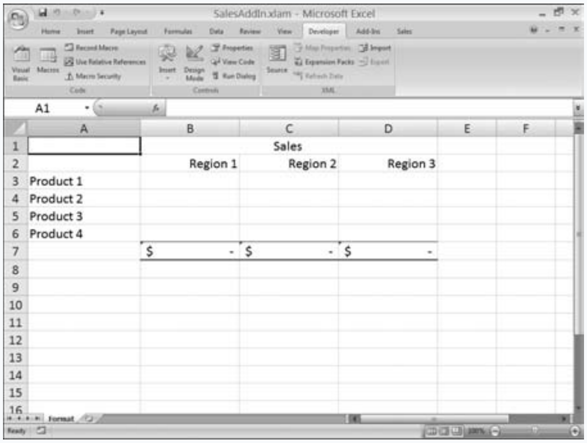
The worksheets appear in the add-in.



Microsoft Visual Basic - SalesAddIn.xlam - [Module3 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
Project - SalesAddIn
SalesAddIn (SalesAddIn.xlam)
Microsoft Excel Objects
Sheet3 (Format)
ThisWorkbook
Modules
Module1
Module2
Module3
(General)
SignAndDate
Properties - ThisWorkbook
ThisWorkbook Workbook
Alphabetic
Categorized
2
3

```
Sub SignAndDate()
ctiveSheet.Cells(10, 1) = "Reviewed by: " &
End Sub
```

EnableAutoRecover	True
EncryptionProvider	
EnvelopeVisible	False
Final	False
ForceFullCalculation	False
HighlightChangesOnScr	False
InactiveListBorderVisible	True
IsAddin	False
KeepChangeHistory	True
ListChangesOnNewShee	False
Password	********
PersonalViewListSetting	True
PersonalViewPrintSettin	True
PrecisionAsDisplayed	False
ReadOnlyRecommendec	False
RemovePersonalInform	False
Saved	False
SaveLinkValues	True
ShowConflictHistory	False
ShowPivotChartActiveFi	False



SalesAddIn.xlam - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Sales
Visual Basic
Macros
Record Macro
Use Relative References
Macro Security
Code
Insert
Design Mode
Properties
View Code
Run Dialog
Controls
Source
Map Properties
Expansion Packs
Refresh Data
Import
Export
XML
A1
Format
Ready
100%

	A	B	C	D	E	F
1			Sales			
2		Region 1	Region 2	Region 3		
3	Product 1					
4	Product 2					
5	Product 3					
6	Product 4					
7		$ -	$ -	$ -		
8						
9						
10						
11						
12						
13						
14						
15						
16						

Extra

Before creating your add-in, a good idea is to add information to the Properties pane. Click the Office button, click Prepare, and then click Properties. The Properties pane appears. Type a title in the Title field, type a description in the Comments field, and then close the Properties pane.

In addition to the add-ins you create, you can obtain add-ins from third parties. To learn about special-purpose Excel add-ins in your field, perform a Google search by going to www.google.com. Your search terms should include Excel; the field of knowledge — for example, chemistry; and other information you might have, such as vendor name. Third-party vendors are responsible for supporting their own products.

As with macros, add-ins can spread viruses. For Excel to consider an add-in safe, the add-in must have a current valid digital signature issued by a certificate authority, and the developer of the add-in must be a trusted publisher. If the Excel Trust Center considers an add-in unsafe, it disables the add-in and displays a message bar to alert you to the potentially unsafe add-in. You can click the Options button on the message bar to enable the add-in.

Install Add-Ins

Bundled add-in software is included with Excel, but Excel does not automatically install the software when you install Excel. The following are among the add-ins that come standard with Excel:

- The Conditional Sum Wizard enables you to create a formula that sums only the values that meet the criteria you specify.
- The Euro Currency Tools add-in enables you to calculate exchange rates between the Euro and other currencies.
- The Data Analysis Toolpak provides a number of tools you can use for statistical analysis.
- Solver enables you to produce the formula result you want by directly or indirectly adjusting cells related to the cell that contains the formula.

You install bundled add-ins and the add-ins you create by using the Excel Options dialog box. You can find all add-ins in the Add-Ins section. When you save an add-in to a user's AddIns folder or to the Library folder under the Office program, it becomes available for installation in the Excel Options dialog box. Once installed, the add-in is available right away.

You can download additional Excel add-ins from the Microsoft download site. For example, for Excel 2007, Microsoft has an add-in that adds a Get Started tab to the Excel 2007 Ribbon. The commands on this tab give you quick access to free online content to help you learn Excel 2007 quickly.

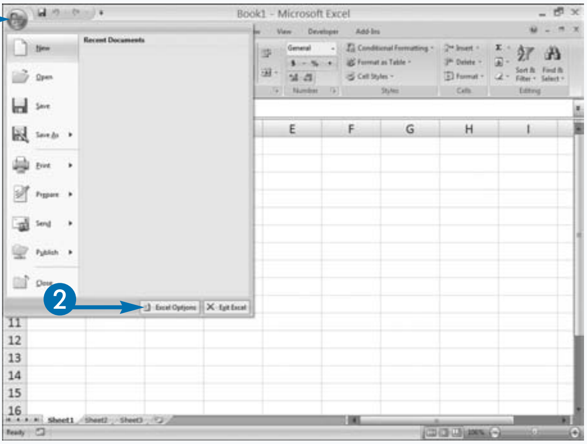
You can take advantage of third-party add-ins. Consult the developer of these programs for documentation.

Install Add-Ins

① Click the Office button.

A menu appears.

② Click Excel Options.



The Excel Options dialog box appears.

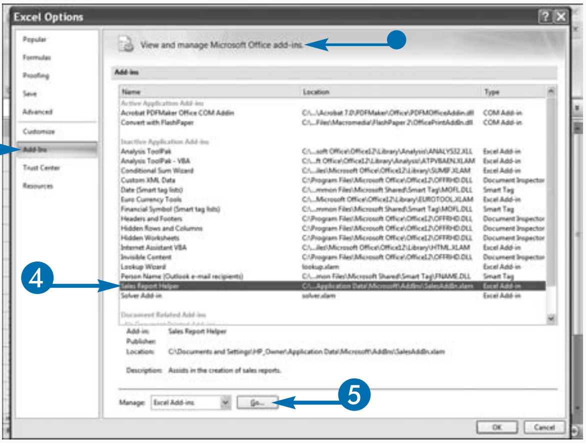
③ Click Add-Ins.

- The View and Manage Microsoft Office Add-Ins screen appears.

④ Click an add-in.

The example uses the Sales Report Helper add-in created earlier in this chapter.

⑤ Click Go.



Name	Location	Type
Active Application Add-ins		
Acrobat PDFMaker Office COM Addin	C:\...\Acrobat 7.0\PDFMaker\Office\PDFMOfficeAddin.dll	COM Add-in
Convert with FlashPaper	C:\...Files\Macromedia\FlashPaper 2\OfficePrintAddIn.dll	COM Add-in
Inactive Application Add-ins		
Analysis ToolPak	C:\...soft Office\Office12\Library\Analysis\ANALYS32.XLL	Excel Add-in
Analysis ToolPak - VBA	C:\...ft Office\Office12\Library\Analysis\ATPVBAEN.XLAM	Excel Add-in
Conditional Sum Wizard	C:\...iles\Microsoft Office\Office12\Library\SUMIF.XLAM	Excel Add-in
Custom XML Data	C:\Program Files\Microsoft Office\Office12\OFFRHD.DLL	Document Inspector
Date (Smart tag lists)	C:\...mmon Files\Microsoft Shared\Smart Tag\MOFL.DLL	Smart Tag
Euro Currency Tools	C:\...Microsoft Office\Office12\Library\EUROTOOL.XLAM	Excel Add-in
Financial Symbol (Smart tag lists)	C:\...mmon Files\Microsoft Shared\Smart Tag\MOFL.DLL	Smart Tag
Headers and Footers	C:\Program Files\Microsoft Office\Office12\OFFRHD.DLL	Document Inspector
Hidden Rows and Columns	C:\Program Files\Microsoft Office\Office12\OFFRHD.DLL	Document Inspector
Hidden Worksheets	C:\Program Files\Microsoft Office\Office12\OFFRHD.DLL	Document Inspector
Internet Assistant VBA	C:\...iles\Microsoft Office\Office12\Library\HTML.XLAM	Excel Add-in
Invisible Content	C:\Program Files\Microsoft Office\Office12\OFFRHD.DLL	Document Inspector
Lookup Wizard	lookup.xlam	Excel Add-in
Person Name (Outlook e-mail recipients)	C:\...mon Files\Microsoft Shared\Smart Tag\FNAME.DLL	Smart Tag
Sales Report Helper	C:\...Application Data\Microsoft\AddIns\SalesAddIn.xlam	Excel Add-in
Solver Add-in	solver.xlam	Excel Add-in
Document Related Add-ins		

Add-in: Sales Report Helper
Publisher:
Location: C:\Documents and Settings\HP_Owner\Application Data\Microsoft\AddIns\SalesAddIn.xlam

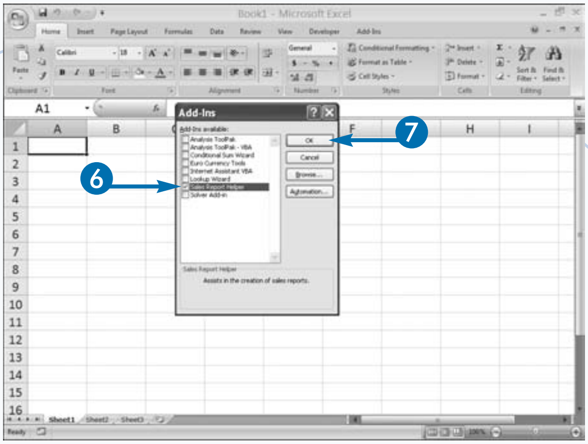
Description: Assists in the creation of sales reports.

Manage: Excel Add-ins

The Add-Ins dialog box appears and provides access to several options.

6 Click to select the add-in you want to install (☐ changes to ☑).

7 Click OK.


Book1 - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
A1
6
7
OK
Cancel
Browse...
Automation...

Add-Ins

Add-Ins available:

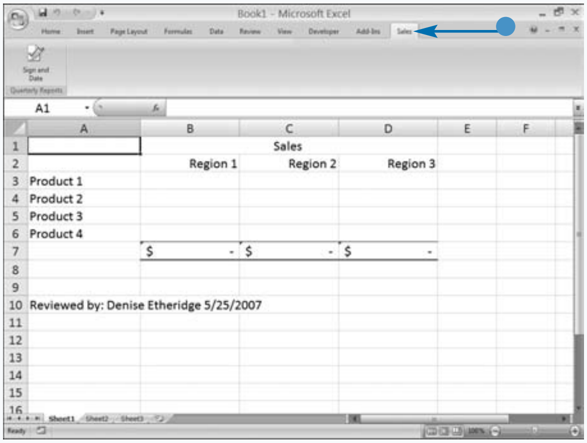
☐ Analysis ToolPak
☐ Analysis ToolPak - VBA
☐ Conditional Sum Wizard
☐ Euro Currency Tools
☐ Internet Assistant VBA
☐ Lookup Wizard
☑ Sales Report Helper
☐ Solver Add-in

Sales Report Helper

Assists in the creation of sales reports.

Excel installs the add-in.

- In this example, you know Excel installed the add-in because you can see the custom Ribbon tab.


Book1 - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Sales
Sign and Date
Quarterly Reports
A1
Sheet1
Sheet2
Sheet3
Ready

	A	B	C	D
1			Sales	
2		Region 1	Region 2	Region 3
3	Product 1			
4	Product 2			
5	Product 3			
6	Product 4			
7		$ -	$ -	$ -
8				
9				
10	Reviewed by: Denise Etheridge 5/25/2007			

Extra

Removing an add-in from Excel is easy. Click the Office button, click Excel Options, click Add-ins, click the add-in you want to remove, and then click Go. The Add-Ins dialog box appears. Click to deselect the add-in you want to remove and then click OK. Excel removes the add-in.

The only way to remove an add-in from the Add-Ins section of the Excel Options dialog box is to delete the file from the folder in which it is stored. Then try to use the add-in. Excel realizes it is not there and deletes it from the Excel Options dialog box.

Microsoft has a set of SQL Server 2005 Data Mining add-ins for Office 2007 with which you to take advantage of SQL Server 2005's predictive analytics in Excel 2007. The add-ins are named Table Analysis. You can download these add-ins from the Microsoft Web site.

Using VBA to Load Add-Ins

If you want to add an add-in by using a procedure, use the `Add` method with an `AddIn` object. The `Add` method adds an add-in to the Excel Options dialog box. The `Add` method does not install an add-in. The following is the syntax for the `Add` method:

```
expression.Add(Filename, Open)
```

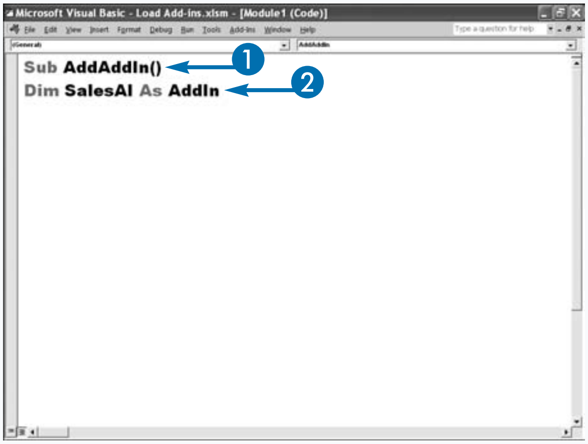
Use the expression to identify the add-in or a variable that represents the add-in. Use the `Filename` parameter to identify the add-in you want to add. If the file is located in the current folder, type the file name, enclosed in quotes. If the file is located in another folder, type the path to the file enclosed in quotes. If your add-in is located on a removable disk such as a floppy disk or a compact disc and you want to move the file from the removable disk to the Library folder under the Office program, set the `Open` parameter to `True`. If you want the file to remain on the removable disk, set the `Open` parameter to `False`. If you do not include this parameter and your add-in is located on a removable disk, Excel displays a prompt asking the user if he or she wants to move the file to the hard drive. If your add-in is not located on a removable disk, VBA ignores the `Open` parameter.

As stated earlier, the `Add` method does not install an add-in. To install an add-in, you must set the `Install` property to `True`. You can add an add-in and install it in a single step by using the following syntax:

```
AddIns.Add("Sample.xlam").Installed = True
```

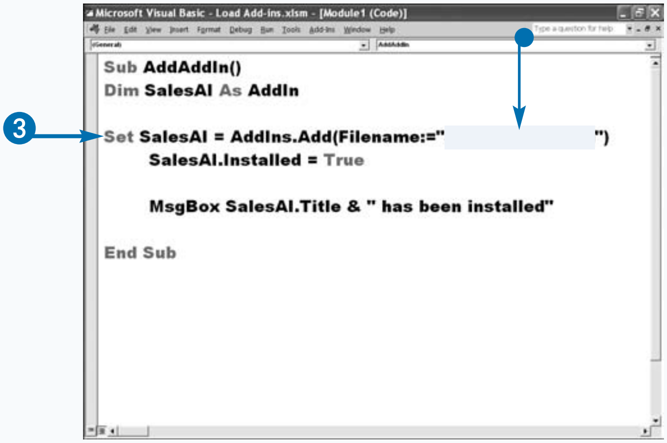
Using VBA to Load Add-Ins

1. Name your procedure.
2. Declare a variable as an `AddIn` object.


Microsoft Visual Basic - Load Add-Ins.xlsm - [Module1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
AddAddIn
1
2

```
Sub AddAddIn()
Dim SalesAI As AddIn
```

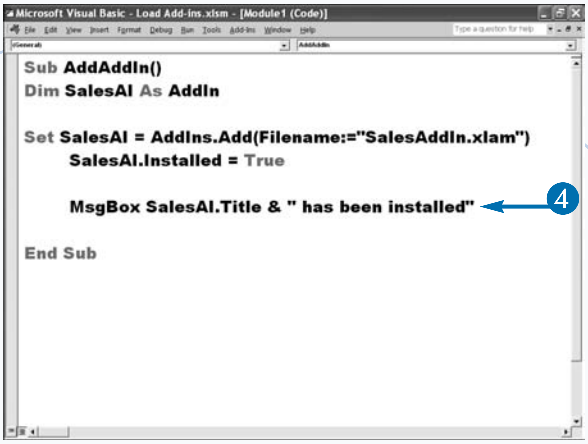
3. Add the add-in.
- This is the add-in file you want to add.


Microsoft Visual Basic - Load Add-Ins.xlsm - [Module1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
AddAddIn
3

```
Sub AddAddIn()
Dim SalesAI As AddIn

Set SalesAI = AddIns.Add(Filename:="                    ")
    SalesAI.Installed = True

    MsgBox SalesAI.Title & " has been installed"

End Sub
```

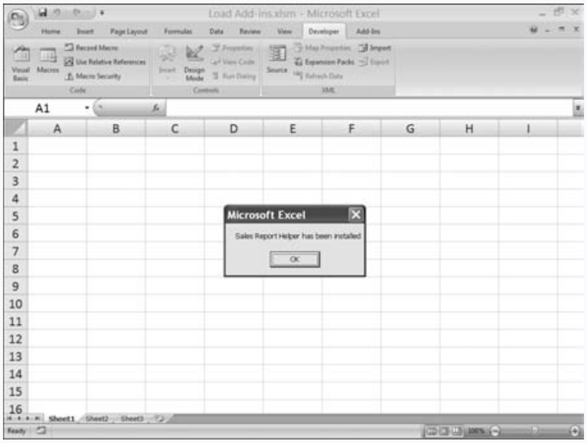
④ Display a `MsgBox` letting you know the add-in has been installed.

⑤ Press Alt+F11 to switch from the VBE to Excel, and run the macro.


Microsoft Visual Basic - Load Add-Ins.xlsm - [Module1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
AddAddIn
4

```
Sub AddAddIn()
Dim SalesAI As AddIn

Set SalesAI = AddIns.Add(Filename:="SalesAddIn.xlam")
    SalesAI.Installed = True

    MsgBox SalesAI.Title & " has been installed"

End Sub
```

The macro installs the add-in and displays a message box.


Load Add-ins.xlsm - Microsoft Excel
Home Insert Page Layout Formulas Data Review View Developer Add-Ins
A1
Sheet1 Sheet2 Sheet3
Ready

Microsoft Excel

Sales Report Helper has been installed

OK

Extra

The Add-Ins dialog box tells you a lot about add-ins. To open the Add-Ins dialog box, click the Office button, click Excel Options, click Add-Ins, and then click Go. The Add-Ins dialog box appears. All of the add-ins available in Excel appear in the Add-Ins dialog box. Each add-in listed is part of the `AddIns` collection. You can reference Add-ins in the `AddIns` collection by their title or by their index value. You determine the index value by the order in which Excel lists the add-ins in the Add-Ins dialog box. The first add-in has an index value of 1, the second 2, and so on. The title of an add-in is the name listed in the Add-Ins dialog box.

You can reference the index value of an add-in or its title to uninstall the add-in. To uninstall an add-in, set the `Installed` property to `False`. The following example uninstalls an add-in.

Example:

```
Addins.("sample").Installed = False
```

Introducing XML

The default file format for Office 2007 is EXtensible Markup Language (XML). For this reason, as a VBA programmer, you should have a basic understanding of XML. The appeal of XML is that it makes exchanging data between different software applications and different computer systems easier. When you markup up your data using XML, it is then available to be processed by a variety of different systems, without regard to hardware or operating system. You can use the same XML data in Word, Excel, Access, and other programs. Prior to Office 2007, Office files were in a proprietary format. Manipulating and sharing the data with other applications and systems was difficult.

XML is similar to HyperText Markup Language (HTML), the language used to format data displayed in a Web page. If you are familiar with HTML, learning XML will be easy. Both HTML and XML are markup languages and, as such, they both use tags. In HTML, the tags are predefined; in XML, you define the tags.

XML and HTML have different purposes. You use HTML to format data so you can display your data in a Web page. You use XML to describe your data. Your XML tags can be anything you want them to be, but they should describe your data. Each XML tag describes the data contained in the tag.

You do not need to purchase any software to create an XML file; you can create XML in any text editor. For example, you can use Notepad to create an XML file. However, you must give your XML files an .xml file extension.

A complete explanation of XML is beyond the scope of this book. However, the brief overview of XML that follows provides a basic understanding of the examples provided in this book.

Declaration Statement

You start each XML file with a declaration. The declaration lets the program processing your file know that your file is an XML file. The following is an example of a declaration statement:

```
<?xml version="1.0" encoding="UTF-8 "standalone="yes" ?>
```

`Xml` identifies the file as an XML file, 1.0 is the version of XML used, `UFT-8` is the character set used to encode the data, and `standalone` tells the processing program whether the document contains references to other documents.

Tags

In XML, you call a unit of data an element. You use tags to describe each element. Angle brackets surround tags: < and >. In this example, `<CustomerName>Royal Flyers </CustomerName>`, `<CustomerName>`, and `</CustomerName>` are the opening and closing tags for the element. They tell you that Royal Flyers is the name of the customer. The opening tag marks the beginning of the element. The closing tag marks the end of the element. The closing tag always includes a forward slash. In addition, be aware that XML is case-sensitive. The tag `<UnitPrice>` is not the same as `<unitprice>`. Your opening tag and closing tag must be in the same case. You place your data between the opening tag and the closing tag. Every tag must include a closing tag or be an empty tag.

Attributes

You can include attributes within an XML tag. Attributes provide information to the program that is manipulating the data. The following is an example of a tag that includes a `FileType` attribute.

```
<CustomerName FileType ="J5793" > Royal Flyers
</CustomerName>
```

You must enclose attributes in quotes. You can use single quotes or double quotes. An element can have multiple attributes.

Empty Tags

Empty tags are tags that do not have any content. Empty tags do not require a closing tag. However, empty tags must include a forward slash as part of the tag. The following is an example of an empty tag.

Example:

```
<button id="Button1" imageMso="AccessFormWizard"
size="large" label = "Report Format"
onAction= "ThisWorkbook.SignAndDate" />
```

In the example, the element has attributes but no content. You use the element to pass information to the reading program.

Structure

You structure XML hierarchically. Consider the following example:

```
<CustomerInfo>
      <CustId>C001</CustId>
      <CustomerName>Royal Flyers</CustomerName>
      <TransDate>2007-06-01</TransDate>
            <PurchaseInfo>
                  <Quantity>12</Quantity>
                  <ItemNo>OS-001</ItemNo>
                  <Description>Pencils</Description>
                  <UnitPrice>3.99</UnitPrice>
            </PurchaseInfo>
            <PurchaseInfo>
                  <Quantity>6</Quantity>
                  <ItemNo>OS-004</ItemNo>
                  <Description>Paper</Description>
                  <UnitPrice>25.98</UnitPrice>
            </PurchaseInfo>
</CustomerInfo>
```

The data between the `CustomerInfo` tags contains information about a single customer. The file can contain multiple customers. The information between the `PurchaseInfo` tags contains information about an individual purchase. In the example, a single customer made two purchases, so the `PurchaseInfo` tags are inside the `CustomerInfo` tags. Shown graphically, you can structure data as follows:

```
CustInfo
    Customer 1
        Purchase 1
        Purchase 2
    Customer 2
        Purchase 1
CustInfo
```

Every XML file must have a set of root tags. The root tags describe the document and surround the child tags. Every document ends with a root tag. In the example, `<CustomerInfo>` and `</CustomerInfo>` are root tags. All of the tags between the `<CustomerInfo>` tags are child tags.

When structuring your XML file, you must properly nest your tags. In the example, you must close each purchase before you start a new purchase.

If you want to exchange your data with other systems, your XML file must be well formed. If your data is not well formed, your XML file will not work. Well-formed XML files comply with the following rules:

- They begin with a declaration.
- They contain a root tag.
- Every tag either has a closing tag or is an empty tag.
- Opening and closing tags use the same case.
- Tags are properly nested.
- Attributes are enclosed in either single or double quotes.

Element Names

You can name elements anything you want; however, element names should describe your data. Element names must also conform to the following rules:

- Names can contain letters, numbers, and other characters.
- Names cannot contain spaces.
- Names cannot start with the letters XML, a number, or a punctuation character.
- You can use an underscore to separate the words in a name, as in Customer_Information.

You should try to keep your element names short and, although it is allowed, avoid using the "—" and the "." in your element names. If you create an element name such as Customer-Info, the reading program may try to subtract Customer from Info; if you create a name such as Customer.Info, the reading program may think Info is a property of customer.

Schemas

Schemas are another important component of XML. Schemas contain the rules that help the processing program validate your data. For example, a schema tells the processing program whether a tag should contain text or a number. In that way, the schema prevents the entry of invalid data. For example, if data between your LastName tags should always be a string, a schema prevents the entry of numbers.

If you are importing an XML file into Excel, and your XML file does not have a schema, Excel creates one. Excel maps the items in cells to the items in the schema. Mapping allows you to display in your worksheet only the data you want to see. It also allows you to refresh your data and save your data in XML format.

Understanding Excel XML Files

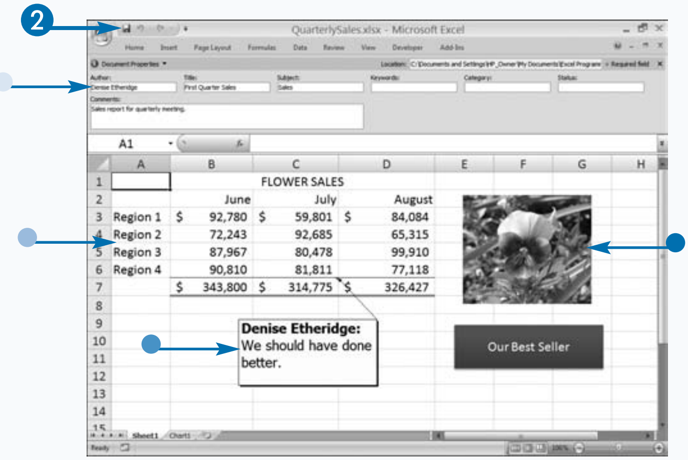
Prior to Office 2007, by default, Office files were saved as binary files in a proprietary format. You can still save your files in the binary format by saving them as Excel 97-2003 files if you need to share files with users who do not have Office 2007. However, the binary file type is no longer the default. Moreover, when you save your file as an Excel 97-2003 file, Office 2007 features that are not supported in earlier versions are lost.

In Office 2007, the default file type is based on XML. The XML file format has several advantages.

- XML files are smaller. The XML file format uses Zip technology, which compresses the files. As a result, when you compare XML files to binary files, the XML files can be up to 75 percent smaller. This means they take up less space and are easier to transfer via mechanisms such as e-mail.
- XML files are more secure. In the default XLSX format, you cannot include macros. This gives you assurance that your XLSX files do not include any malicious macro viruses. If you want to save macros in your Excel file, you must save the file with an .xlsm extension. Excel places the macros in a separate part of the file that is more secure.
- Data is easier to recover in XML files. XML files are human-readable. You can open the files and read the contents by using a text editor such as Notepad. If part of the file becomes corrupted, you can open the file and recover the part that is not corrupted.

Understanding Excel XML Files

CREATE AND SAVE AN EXCEL FILE


2
QuarterlySales.xlsx - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Document Properties
A1
Sheet1
Chart1
Ready
Our Best Seller

Location: C:\Documents and Settings\HP_Owner\My Documents\Excel Programs

Author: Denise Etheridge

Title: First Quarter Sales

Subject: Sales

Keywords:

Category:

Status:

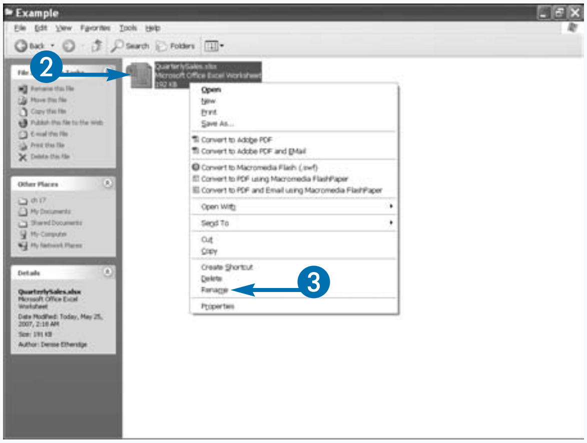
Comments: Sales report for quarterly meeting.

	A	B		C		D
1				FLOWER SALES		
2			June		July	August
3	Region 1	$	92,780	$ 59,801	$	84,084
4	Region 2		72,243	92,685		65,315
5	Region 3		87,967	80,478		99,910
6	Region 4		90,810	81,811		77,118
7		$	343,800	$ 314,775	$	326,427

Denise Etheridge: We should have done better.

1. Create an Excel file.
   - Include an Image.
   - Include a comment.
   - Include data.
   - Include properties.
2. Click the Save button to save the file.

OPEN AN EXCEL FILE


Example
File
Edit
View
Favorites
Tools
Help
Back
Search
Folders
2
File and Folder Tasks
Rename this file
Move this file
Copy this file
Publish this file to the Web
E-mail this file
Print this file
Delete this file
Other Places
ch 17
My Documents
Shared Documents
My Computer
My Network Places
Details
QuarterlySales.xlsx
Microsoft Office Excel Worksheet
192 KB
Open
New
Print
Save As...
Convert to Adobe PDF
Convert to Adobe PDF and EMail
Convert to Macromedia Flash (.swf)
Convert to PDF using Macromedia FlashPaper
Convert to PDF and Email using Macromedia FlashPaper
Open With
Send To
Cut
Copy
Create Shortcut
Delete
Rename
Properties
3

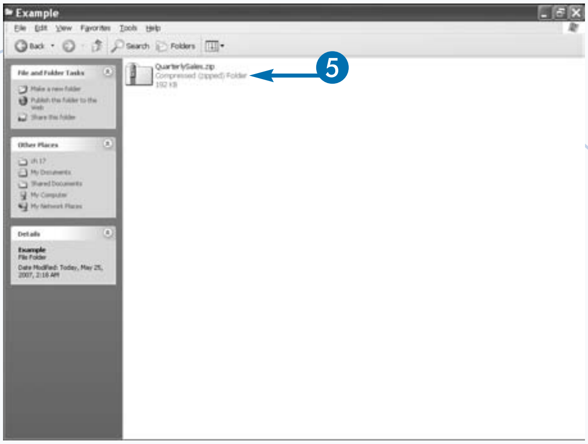
QuarterlySales.xlsx
Microsoft Office Excel Worksheet
Date Modified: Today, May 25, 2007, 2:18 AM
Size: 191 KB
Author: Denise Etheridge

1. In Windows Explorer, move to the folder where you saved your file.
2. Right-click the file name.
3. Click Rename.

④ Change the file extension to .zip.

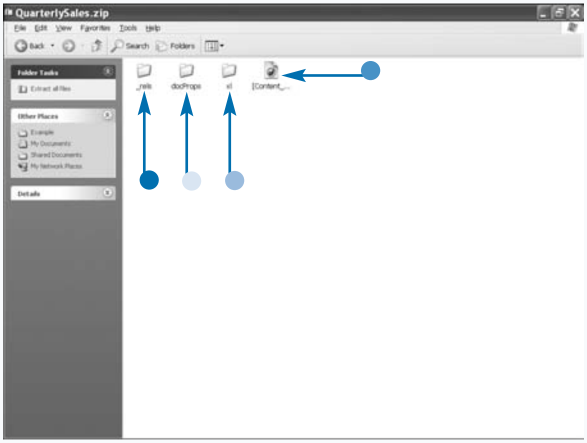
Windows asks if you are sure you want to change the file extension. Click Yes.

⑤ Double-click the file.


Example
QuarterlySales.zip
Compressed (zipped) Folder
192 KB
File and Folder Tasks
Other Places
Details
5

The file opens.

- The _rels folder stores information about relationships.
- The [Content_Types].xml part stores information about what is in the package.
- The xl folder stores the workbook component files.
- The docProps folder stores information about the document properties.


QuarterlySales.zip
Folder Tasks
Extract all files
Other Places
Details
_rels
docProps
xl
[Content_...

Extra

To assign properties to a file, click the Office button, click Prepare, and then click Properties. The Properties pane appears in your workbook. Enter the properties you want to enter. In the upper-right corner of the Properties pane, click Document Properties, and then click Advanced Properties. The Properties dialog box appears. You can use the Properties dialog box to review properties and to add custom properties.

If you have a computer with Excel 97-2003 installed, you can go to the Office Update Web site and download the 2007 Microsoft Office system Compatibility Pack for Excel. After you install the Compatibility Pack, you can open Excel 2007 files in Excel 97-2003. Excel features and formatting may not display in the earlier version, but they are still available when you open the file again in Excel 2007.

To view the contents of an Excel workbook file, change the file extension to .zip and then double-click the file. To use the file again, change the extension back to the extension the file originally had.

continued →

Understanding Excel XML Files (continued)

If you want to see the XML layout for an Excel 2007 file, change the file extension on the Excel file to .zip and then double-click the file. The file opens and several folders and files appear.

Office 2007 files are in a compressed ZIP format; each ZIP file is called a package. A package has three major components: Part Items, Content Type Items, and Relationship Items.

Each file inside a package is called a part. When you open an Excel file, a workbook.xml file is in the xl folder. You may also find a styles.xml file. These files are "parts" of the package. Most parts are XML files that describe the data contained in the Excel workbook.

Excel uses content type items to describe the contents of a part. These descriptions enable you to determine the contents of a file so you can write code that correctly processes the file.

Relationships define how the parts of a document come together to form a document. The relationships are stored in the /_rels folders in .rels files in the root and in subdirectories of the file.

Excel divides a workbook package into several parts. Some of the parts you may see in a package are charts, comments, themes, styles, and workbook drawings. You can manually modify and replace document parts, and you can write programs to modify and replace document parts.

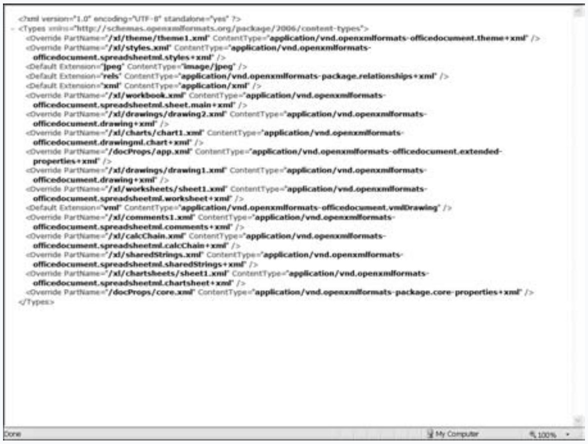
If your document includes images, the actual images are stored in the file. For security proposes, the images are named image1, image2, and so on.

Content Type.xml

XML FILE

① Double-click Content_Type.xml.

The file opens in Internet Explorer or your default XML Editor.



```
<?xml version="1.0" encoding="UTF-8" standalone="yes" ?>
- <Types xmlns="http://schemas.openxmlformats.org/package/2006/content-types">
   <Override PartName="/xl/theme/theme1.xml" ContentType="application/vnd.openxmlformats-officedocument.theme+xml" />
   <Override PartName="/xl/styles.xml" ContentType="application/vnd.openxmlformats-
     officedocument.spreadsheetml.styles+xml" />
   <Default Extension="jpeg" ContentType="image/jpeg" />
   <Default Extension="rels" ContentType="application/vnd.openxmlformats-package.relationships+xml" />
   <Default Extension="xml" ContentType="application/xml" />
   <Override PartName="/xl/workbook.xml" ContentType="application/vnd.openxmlformats-
     officedocument.spreadsheetml.sheet.main+xml" />
   <Override PartName="/xl/drawings/drawing2.xml" ContentType="application/vnd.openxmlformats-
     officedocument.drawing+xml" />
   <Override PartName="/xl/charts/chart1.xml" ContentType="application/vnd.openxmlformats-
     officedocument.drawingml.chart+xml" />
   <Override PartName="/docProps/app.xml" ContentType="application/vnd.openxmlformats-officedocument.extended-
     properties+xml" />
   <Override PartName="/xl/drawings/drawing1.xml" ContentType="application/vnd.openxmlformats-
     officedocument.drawing+xml" />
   <Override PartName="/xl/worksheets/sheet1.xml" ContentType="application/vnd.openxmlformats-
     officedocument.spreadsheetml.worksheet+xml" />
   <Default Extension="vml" ContentType="application/vnd.openxmlformats-officedocument.vmlDrawing" />
   <Override PartName="/xl/comments1.xml" ContentType="application/vnd.openxmlformats-
     officedocument.spreadsheetml.comments+xml" />
   <Override PartName="/xl/calcChain.xml" ContentType="application/vnd.openxmlformats-
     officedocument.spreadsheetml.calcChain+xml" />
   <Override PartName="/xl/sharedStrings.xml" ContentType="application/vnd.openxmlformats-
     officedocument.spreadsheetml.sharedStrings+xml" />
   <Override PartName="/xl/chartsheets/sheet1.xml" ContentType="application/vnd.openxmlformats-
     officedocument.spreadsheetml.chartsheet+xml" />
   <Override PartName="/docProps/core.xml" ContentType="application/vnd.openxmlformats-package.core-properties+xml" />
 </Types>
```

_RELS FILE

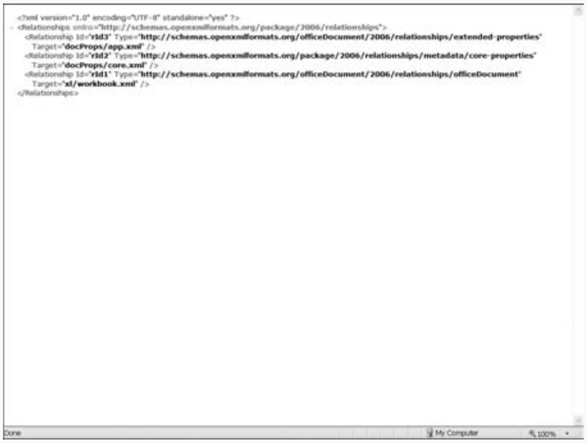
① Double-click the _rels folder to open it.

The .rels file appears.

② Double-click the .rels in the file.

The file opens in Internet Explorer.

The file sets relationships.



```
<?xml version="1.0" encoding="UTF-8" standalone="yes" ?>
- <Relationships xmlns="http://schemas.openxmlformats.org/package/2006/relationships">
   <Relationship Id="rId3" Type="http://schemas.openxmlformats.org/officeDocument/2006/relationships/extended-properties"
     Target="docProps/app.xml" />
   <Relationship Id="rId2" Type="http://schemas.openxmlformats.org/package/2006/relationships/metadata/core-properties"
     Target="docProps/core.xml" />
   <Relationship Id="rId1" Type="http://schemas.openxmlformats.org/officeDocument/2006/relationships/officeDocument"
     Target="xl/workbook.xml" />
 </Relationships>
```

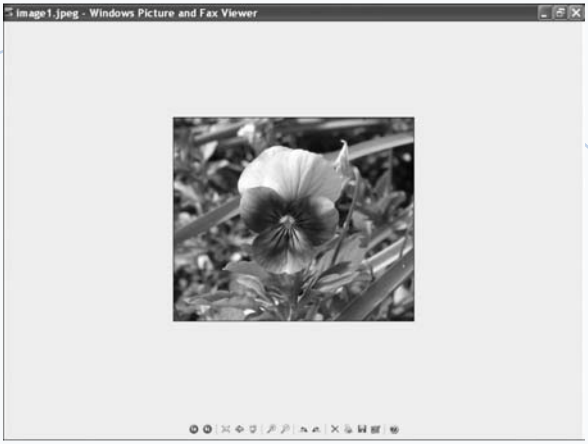
XL FILE

① Double-click the xl folder to open it.

A number of files and folders appear.

② Double-click each part and examine it.

This example opens the media folder and then opens the image file.



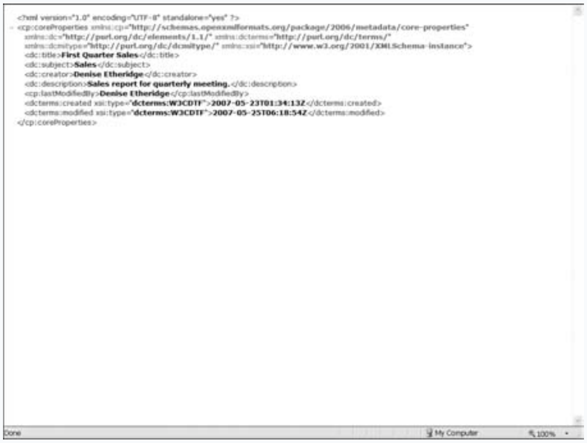
DOCPROPS FILE

① Double-click the docProps folder.

② Double-click the parts and examine them.

The document properties appear.

This example opens the core XML file.



```
<?xml version="1.0" encoding="UTF-8" standalone="yes" ?>
- <cp:coreProperties xmlns:cp="http://schemas.openxmlformats.org/package/2006/metadata/core-properties"
    xmlns:dc="http://purl.org/dc/elements/1.1/" xmlns:dcterms="http://purl.org/dc/terms/"
    xmlns:dcmitype="http://purl.org/dc/dcmitype/" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance">
    <dc:title>First Quarter Sales</dc:title>
    <dc:subject>Sales</dc:subject>
    <dc:creator>Denise Etheridge</dc:creator>
    <dc:description>Sales report for quarterly meeting.</dc:description>
    <cp:lastModifiedBy>Denise Etheridge</cp:lastModifiedBy>
    <dcterms:created xsi:type="dcterms:W3CDTF">2007-05-23T01:34:13Z</dcterms:created>
    <dcterms:modified xsi:type="dcterms:W3CDTF">2007-05-25T06:18:54Z</dcterms:modified>
  </cp:coreProperties>
```

Extra

For a detailed explanation of the concepts presented in this section, download “Introducing the Office (2007) Open XML File Formats” (http://msdn2.microsoft.com/en-us/library/aa338205.aspx) from the Microsoft Web site.

You can modify the contents of an Excel package. In the example, you opened the media folder and viewed the image in your Excel document. If you want to change the image, you can take out the image that is in the file and replace it with a new image manually or by using a program. You can also change the text in the document manually or by using a program. For example, if you open a comment file, you will see comments. If you change a comment, the new comment will appear when you open your workbook in Excel again.

As you can see, the XML file format gives you a great deal of flexibility by making your files easy to modify.

Open an XML File in Excel as a Table

If your Excel data consists of columns and rows, you can convert your data to a table. In Excel, tables allow you to manipulate your data easily. Each column heading in a table contains a down arrow. Use the down arrow to sort, filter, and otherwise manipulate your data. Having your data in an Excel table greatly enhances your ability to work with your data.

If you have data that is in well-formed XML format, you can easily open the XML file in Excel as a table and then use Excel to manipulate the data. To find out more about well-formed XML format, see the section "Introducing XML".

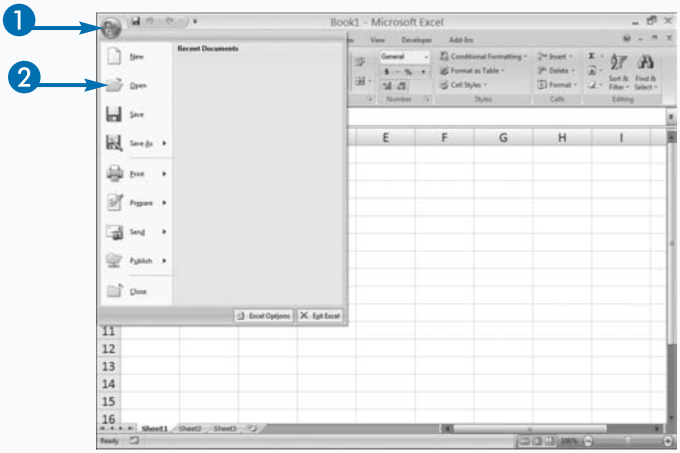
Excel needs a schema to import your XML data. Schemas enable processing programs such as Excel to validate your data. For example, a schema tells the processing program whether a particular element should contain text or a number. When you open an XML file, if your data does not have a schema, Excel creates one. Excel infers the schema from the data that is contained in the XML file.

When you open an XML file as a table, Excel also creates an XML map. Excel uses the map to relate the schema to the data in the worksheet. A single workbook can contain several XML maps, and several maps can refer to the same schema.

Excel creates a graphical hierarchical representation of your data in the XML Source task pane when it opens your XML file as a table. Open the Source pane to see the representation.

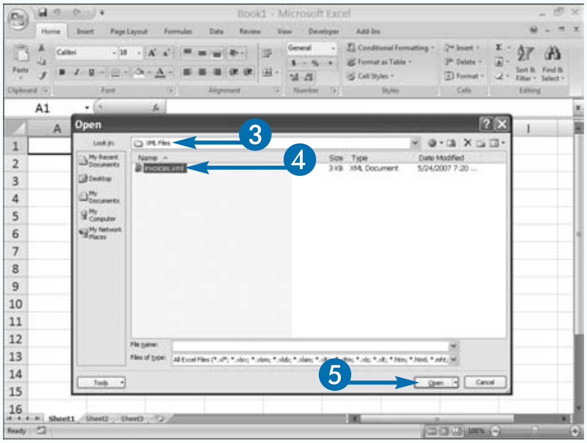
Open An XML File in Excel

1. Click the Office button.
2. Click Open.


1
2
Book1 - Microsoft Excel
Recent Documents
New
Open
Save
Save As
Print
Prepare
Send
Publish
Close
Excel Options
Exit Excel

The Open dialog box appears.

3. Locate the folder that contains your XML file.
4. Click the file.
5. Click Open.

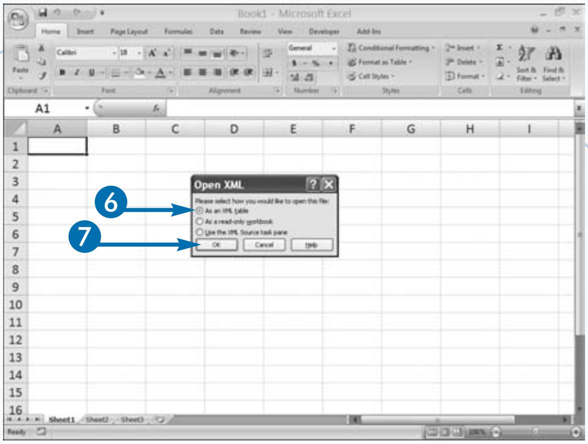

Book1 - Microsoft Excel
Open
Look in:
XML Files
3
4
5
Name
invoices.xml
Size
Type
Date Modified
3 KB
XML Document
5/24/2007 7:20 ...
My Recent Documents
Desktop
My Documents
My Computer
My Network Places
File name:
Files of type:
All Excel Files
Tools
Open
Cancel

The Open XML dialog box appears.

6 Click As an XML table (○ changes to ●).

If Excel asks if you want to create a schema, click Yes.

7 Click OK.


Book1 - Microsoft Excel
6
7
OK
Cancel
Help

Open XML

Please select how you would like to open this file:

● As an XML table

○ As a read-only workbook

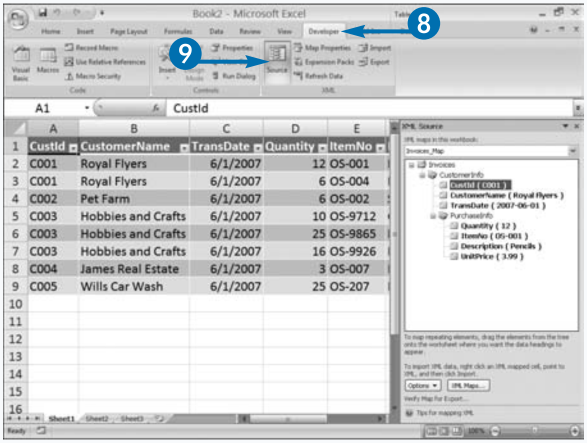
○ Use the XML Source task pane

The file appears in Excel as an Excel table.

8 Click the Developer tab.

9 Click Source.

The map to your data appears.


Book2 - Microsoft Excel
Developer
8
9
Source
XML Source
Invoices_Map
Invoices
CustomerInfo
CustId (C001)
CustomerName (Royal Flyers)
TransDate (2007-06-01)
PurchaseInfo
Quantity (12)
ItemNo (OS-001)
Description (Pencils)
UnitPrice (3.99)

A1 CustId

CustId	CustomerName	TransDate	Quantity	ItemNo
C001	Royal Flyers	6/1/2007	12	OS-001
C001	Royal Flyers	6/1/2007	6	OS-004
C002	Pet Farm	6/1/2007	6	OS-002
C003	Hobbies and Crafts	6/1/2007	10	OS-9712
C003	Hobbies and Crafts	6/1/2007	25	OS-9865
C003	Hobbies and Crafts	6/1/2007	16	OS-9926
C004	James Real Estate	6/1/2007	3	OS-007
C005	Wills Car Wash	6/1/2007	25	OS-207

Extra

The Open XML dialog box presents three choices. You can open the file as an XML table, as a Read-Only workbook, or as a read-only file, or you can use the XML Source task pane. The As an XML table task option is explained in this section. The As a read-only workbook opens the file as read-only and does not create a map to your data. The Use the XML Source task pane option creates a map but does not place any elements in your worksheet. For details on how to work with an XML map, see the section “Create an XML Map”.

When you import or open an XML file, if the file does not have a schema, Excel creates one for you. To view the schema, click the Developer tab and then click Visual Basic to open the VBE. Once in the VBE, press Ctrl+G to open the Immediate window. In the Immediate window, type `Print activeworkbook.XmlMaps(1).Schemas(1).xml`. VBA prints the schema to the Immediate window. You can copy and paste it into a text or XML editor.

Create an XML Map

When you open your file as an Excel table, Excel places all of your data in your worksheet, and you can use the table features in Excel to manipulate your data. You can also create a map to map just the elements you want to use to your worksheet. You complete the process in three steps: create a map, map the elements you want to use to your worksheet, and then refresh your data.

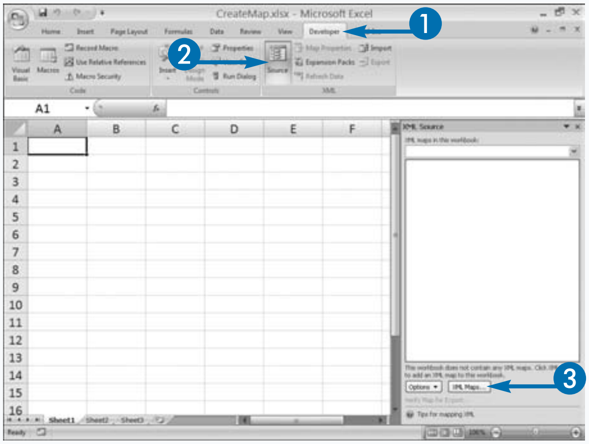
When you use the mapping method, you choose which elements you want to appear in your worksheet. This is especially useful when your XML file has a large number of elements and you only want to work with a subset of those elements. Click on an element in the XML Source task pane and then drag the element onto your worksheet. Excel calls the list of data elements in the XML Source task pane a map, and the process of clicking and dragging elements to your worksheet is mapping. Excel creates a connection between the element in the XML Source task pane and your data. If you want to see the connection after you place an element in your worksheet, click the element in the Source task pane and Excel highlights the data in your worksheet. If you click data in your worksheet, Excel highlights the element name in the XML Source task pane.

When you create a map and then bring your data into Excel, you gain the same benefits as when you open a file in XML format. You can use all of Excel's table features to sort and filter your data.

Create an XML Map

1. Click the Developer tab.
2. Click Source.

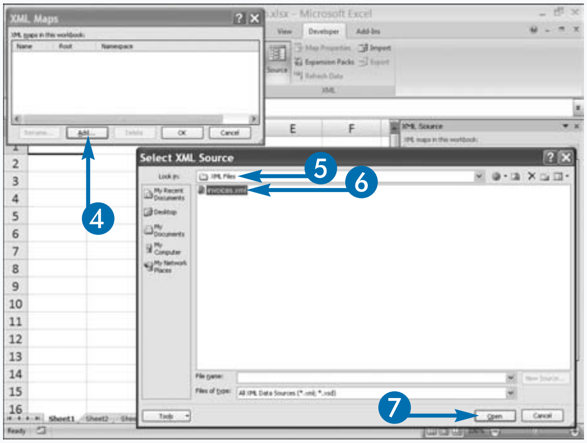
   The XML Source task pane appears.
3. Click XML Maps.



   The XML Maps dialog box appears.
4. Click Add.

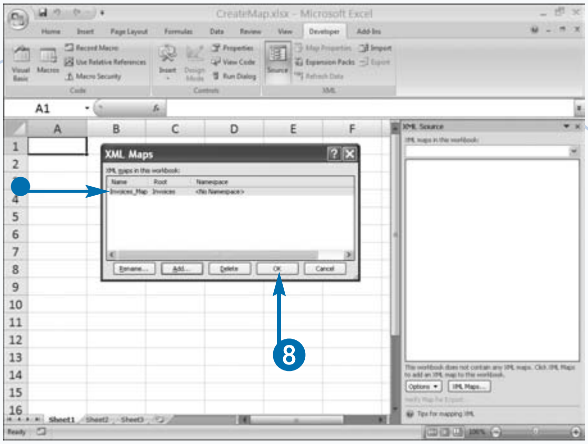
   The Select XML Source dialog box appears.
5. Locate the folder that contains the file you want to map.
6. Click the file.
7. Click Open.

   If Excel asks if you want to create a schema, click Yes.



- Excel creates your map.

8 Click OK.


CreateMap.xlsx - Microsoft Excel
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
A1
XML Maps
Rename...
Add...
Delete
OK
Cancel
XML Source
8

XML maps in this workbook:

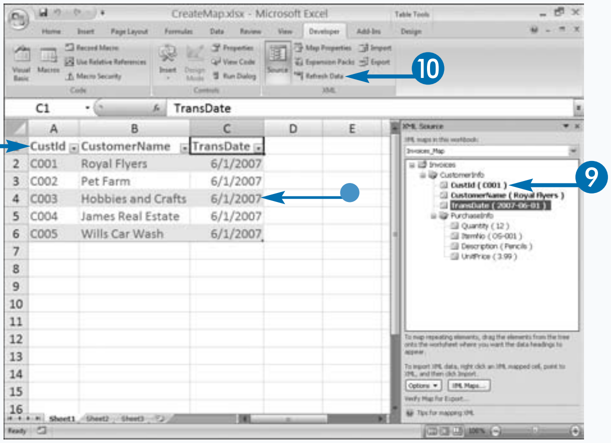
Name	Root	Namespace
Invoices_Map	Invoices	<No Namespace>

Excel adds a map to the XML Source task pane.

9 Click and drag elements from the XML Source task pane to your worksheet.

10 Click Refresh Data.

- Excel adds the data in your XML file to your worksheet.


CreateMap.xlsx - Microsoft Excel
Table Tools
Home
Insert
Page Layout
Formulas
Data
Review
View
Developer
Add-Ins
Design
Map Properties
Import
Expansion Packs
Export
Refresh Data
C1
TransDate
XML Source
Invoices_Map
Invoices
CustomerInfo
CustId (C001)
CustomerName (Royal Flyers)
TransDate (2007-06-01)
PurchaseInfo
Quantity (12)
ItemNo (OS-001)
Description (Pencils)
UnitPrice (3.99)
Options
XML Maps...
9
10
9

CustId	CustomerName	TransDate
C001	Royal Flyers	6/1/2007
C002	Pet Farm	6/1/2007
C003	Hobbies and Crafts	6/1/2007
C004	James Real Estate	6/1/2007
C005	Wills Car Wash	6/1/2007

Extra

After you add an element from your XML file to your Excel worksheet, you may want to delete it. If so, right-click the field heading, click Delete, and then click Delete Columns. Excel deletes the column. If you want to remove the connection between the XML map and your worksheet, right-click the item in the XML Source task pane and then click Remove Element. If you want to restore a connection, right-click the item in the XML Source task pane and then click Map Element. The Map XML Elements dialog box appears. Type the cell address where you want to place the field heading and then click OK.

You can copy and paste your mapped table, but your copy will not have a connection to your map. However, if you move your mapped table by cutting and pasting, your table maintains its connection to the XML map.

Import and Export XML Files Using Excel

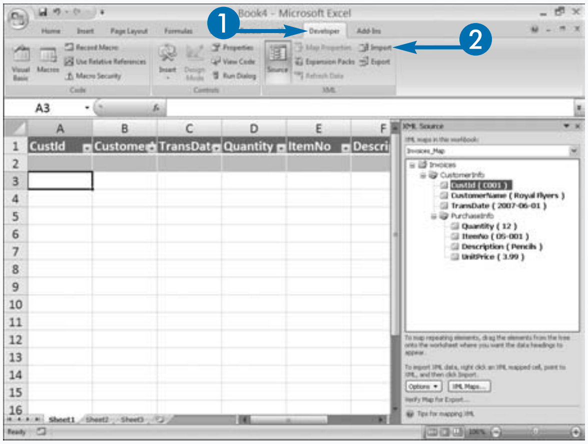
When working with XML data, the data in the XML file may change or you may want to import the additional data. Conversely, you may make changes to the data and want to export the changes to an XML file. If you want to import and export XML data into and out of Excel, use the Import and Export features on the Developer tab. The Import feature opens the Import dialog box, where you can choose the file you want to import. The Export feature opens the Export dialog box, where you can name the file you are exporting.

Importing data enables you to either overwrite your current data or append data to your table. You can use the XML Map Properties dialog box to specify which you want to do. The default is to overwrite existing data with new data. If the system outputting the data has corrected the data or if your old data is no longer relevant, overwriting your data is the better choice. If the system outputting the data outputs data periodically, appending data is the better choice. Appending data enables you to keep your database up-to-date.

You can export data in XML format by using the Export feature on the Developer tab. When you export data, all of the data must be from a single node in your XML map. If you want to verify that Excel can export your data, click Verify Map for Export on the XML Source task pane before exporting. Excel exports your data as a well-formed XML file. A well-formed XML file adheres to all the rules for creating XML files. For more information about well-formed files, see the section “Introducing XML”.

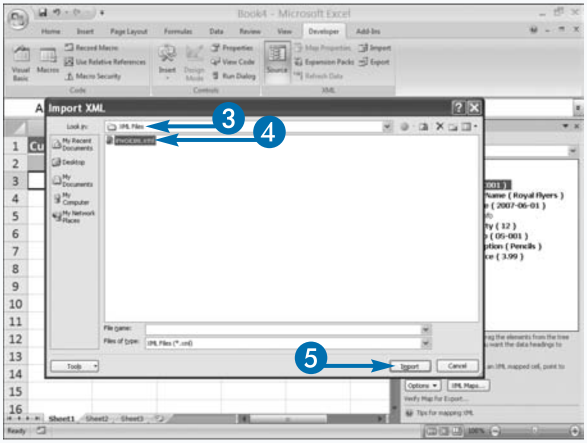
Import and Export XML Files

IMPORT AN XML FILE


Book4 - Microsoft Excel
Developer
Import
1
2
A3
CustId
Customer
TransDat
Quantity
ItemNo
Descri
XML Source
CustId (C001)
CustomerName (Royal Flyers)
TransDate (2007-06-01)
Quantity (12)
ItemNo (05-001)
Description (Pencils)
UnitPrice (3.99)

① Click the Developer tab.

② Click Import.


Book4 - Microsoft Excel
Import XML
3
4
5
Import
Cancel

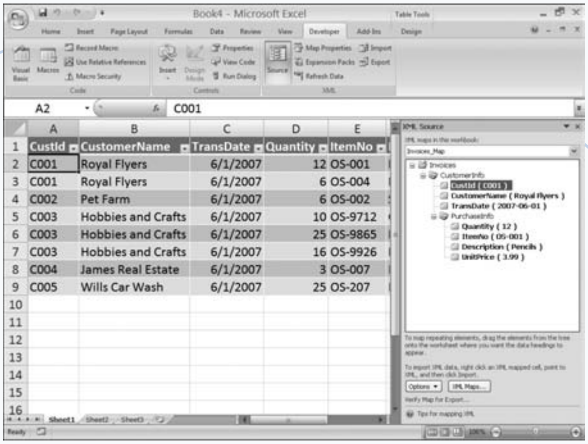
The Import XML dialog box appears.

③ Locate the folder where the file you want to import is located.

④ Click the file you want to import.

⑤ Click Import.

Excel imports the XML data.



A2 C001

CustId	CustomerName	TransDate	Quantity	ItemNo
C001	Royal Flyers	6/1/2007	12	OS-001
C001	Royal Flyers	6/1/2007	6	OS-004
C002	Pet Farm	6/1/2007	6	OS-002
C003	Hobbies and Crafts	6/1/2007	10	OS-9712
C003	Hobbies and Crafts	6/1/2007	25	OS-9865
C003	Hobbies and Crafts	6/1/2007	16	OS-9926
C004	James Real Estate	6/1/2007	3	OS-007
C005	Wills Car Wash	6/1/2007	25	OS-207

CustId (C001)
CustomerName (Royal Flyers)
TransDate (2007-06-01)
Quantity (12)
ItemNo (OS-001)
Description (Pencils)
UnitPrice (3.99)

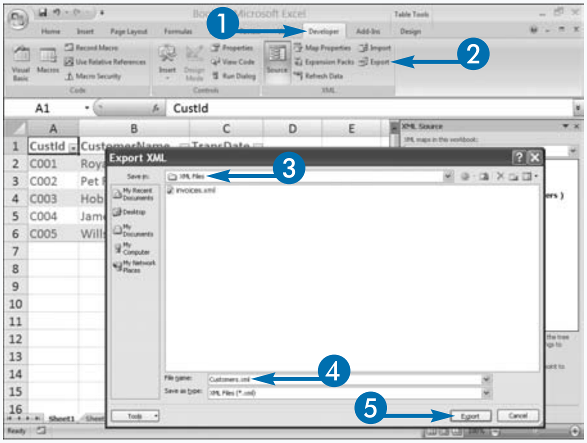
EXPORT AN XML FILE

1. Click the Developer tab.
2. Click Export.

   The Export XML dialog box appears.

3. Locate the folder where you want to save the file.
4. Type a file name.
5. Click Export.

   Excel exports the file.



A1 CustId

Save in: XML Files

invoices.xml

File name: Customers.xml

Save as type: XML Files (*.xml)

Extra

When you import or refresh data, you can either overwrite your current data or append data. Use the XML Map properties dialog box to specify which you want to do. To open the XML Map properties dialog box, click the Developer tab, and then click Map Properties in the XML group. The overwrite and append options are at the bottom of the dialog box.

The XML Source task pane has several options you can set by clicking the Options button in the lower-left corner. Select the Preview Data in Task Pane option to see a sample of the data elements in your XML file in the task pane. Select the Hide Help Text in the Task Pane to prevent Help from appearing at the bottom of the task pane. Select Automatically Merge Elements When Mapping to create a single table when you place elements side by side in a single row in the worksheet.

Load XML Files Using VBA

If you want to automate the process of loading XML data, use the `OpenXML` method. `OpenXML` is the VBA equivalent to opening an XML file as a table. When you open an XML file as a table, `OpenXML` provides several choices. Make your choice by specifying one of the following `XlXmlLoadOption` options: `xlXmlLoadImportToList`, `xlXmlLoadMapXml`, or `xlXmlLoadPromptUser`.

If you select the `xlXmlLoadImportToList` option, VBA creates a map of your data, places the map in the XML Source task pane, and then places all of your XML data in a worksheet formatted as a table.

If you select the `xlXmlLoadMapXml` option, VBA creates a map of your data and places the map in the XML Source task pane. Excel does not place any data in a worksheet.

If you select the `xlXmlLoadPromptUser` option, VBA displays the Open XML dialog box. The user can choose to open the XML file as a table or as a read-only workbook or to use the XML Source task pane. Opening the file as a table is equivalent to the `xlXmlLoadImportToList` option. Using the XML Source task pane is equivalent to the `xlXmlLoadMapXml` option.

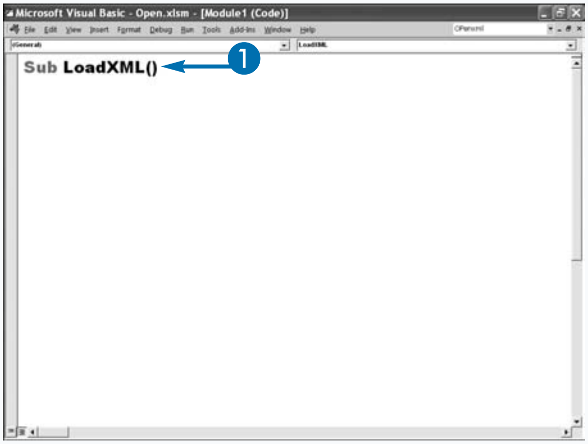
The following is an example of the `OpenXML` method:

```
Sub OpenXMLPromptUser()

        Application.Workbooks.OpenXML _

                Filename:"invoices.xml", _

                LoadOption:=xlXmlLoadPromptUser

End Sub
```

Use the `FileName` parameter to specify the name of the file you want to load. If the file is not located in the current folder, specify the path to the folder.

Load XML Files using VBA

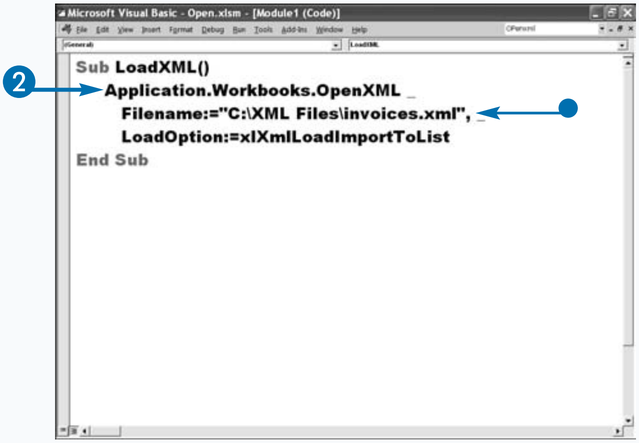
① Name your procedure.


Microsoft Visual Basic - Open.xlsm - [Module1 (Code)]
File
Edit
View
Insert
Format
Debug
Run
Tools
Add-Ins
Window
Help
(General)
LoadXML
1

```
Sub LoadXML()
```

② Create your OpenXML command.

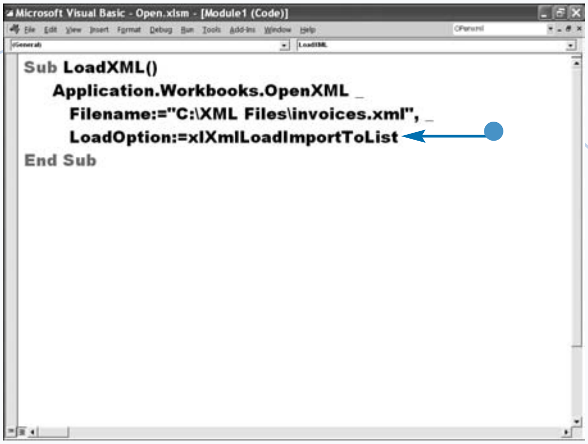
- This is the file you want to load.


Microsoft Visual Basic - Open.xlsm - [Module1 (Code)]
File
Edit
View
Insert
Format
Debug
Run
Tools
Add-Ins
Window
Help
(General)
LoadXML
2

```
Sub LoadXML()
 Application.Workbooks.OpenXML _
   Filename:="C:\XML Files\invoices.xml", _
   LoadOption:=xlXmlLoadImportToList
End Sub
```

- This is the Load option you want to use.

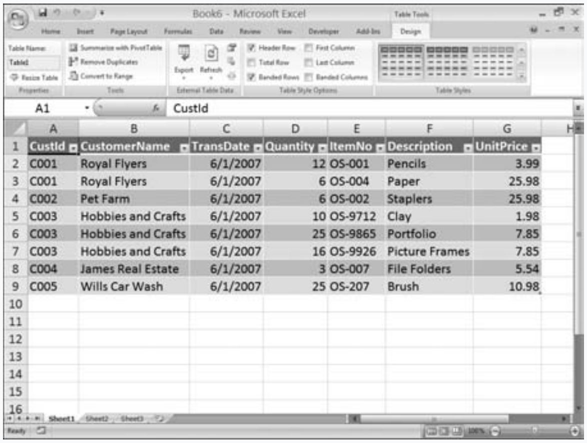
3. Press Alt+F11 to switch from the VBE to Excel, and run the macro.



Microsoft Visual Basic - Open.xlsm - [Module1 (Code)]
File Edit View Insert Format Debug Run Tools Add-Ins Window Help
(General)
LoadXML

```
Sub LoadXML()
    Application.Workbooks.OpenXML _
      Filename:="C:\XML Files\invoices.xml", _
      LoadOption:=xlXmlLoadImportToList
End Sub
```

The macro loads the XML file.



Book6 - Microsoft Excel
Table Tools
Home Insert Page Layout Formulas Data Review View Developer Add-Ins Design
A1
Sheet1 Sheet2 Sheet3
Ready

CustId	CustomerName	TransDate	Quantity	ItemNo	Description	UnitPrice
C001	Royal Flyers	6/1/2007	12	OS-001	Pencils	3.99
C001	Royal Flyers	6/1/2007	6	OS-004	Paper	25.98
C002	Pet Farm	6/1/2007	6	OS-002	Staplers	25.98
C003	Hobbies and Crafts	6/1/2007	10	OS-9712	Clay	1.98
C003	Hobbies and Crafts	6/1/2007	25	OS-9865	Portfolio	7.85
C003	Hobbies and Crafts	6/1/2007	16	OS-9926	Picture Frames	7.85
C004	James Real Estate	6/1/2007	3	OS-007	File Folders	5.54
C005	Wills Car Wash	6/1/2007	25	OS-207	Brush	10.98

Extra

If you want to use VBA to create a document map, use code similar to the following:

```
Sub CreateMap()
'Create an XmlMap object
Dim InvMap As XmlMap
'Add a map and assign the map to the XmlMap Object
Set InvMap = Application _
      .Workbook(1) _
      .XmlMaps.Add("C:\XML Files\invoices.xml")
'Name the Map
InvMap.Name = "Invoices"
```

Import XML Files Using VBA

You can use the `XmlImport` method to load data into a map that already exists. This process is similar to clicking the Import button on the Developer tab. You can refresh your data or import new data into your worksheet. The `XmlImport` method has the following parameters: `Url`, `ImportMap`, `Overwrite`, and `Destination`.

The `Url` parameter is required. Use this parameter to target a URL as a data source. Insert the URL as a string enclosed in double quotes. You can also use this parameter to target a file on your local computer. If the file is located in the current directory, type the file name; otherwise, type the path.

The `ImportMap` parameter is also required. For this parameter, supply the schema map you want VBA to use. You can identify the map by name. When you create a map, Excel assigns it a name. The name appears in the drop-down list at the top of the XML Source task pane. You can also view the list of XML maps in your workbook by clicking the XML Maps button in the XML Source task pane. If you want Excel to create the map, assign `Nothing` to the parameter, as in `ImportMap:=Nothing`.

Use the `Overwrite` parameter to specify whether you want to overwrite the existing data. Set the parameter to `True` if you want to overwrite the data. Set the parameter to `False` if you want to append to the existing data. `True` is the default value.

Use the `Destination` parameter to specify the top-left corner of the range where you want to create the table. If you are importing data into a map that already exists, do not set this parameter.

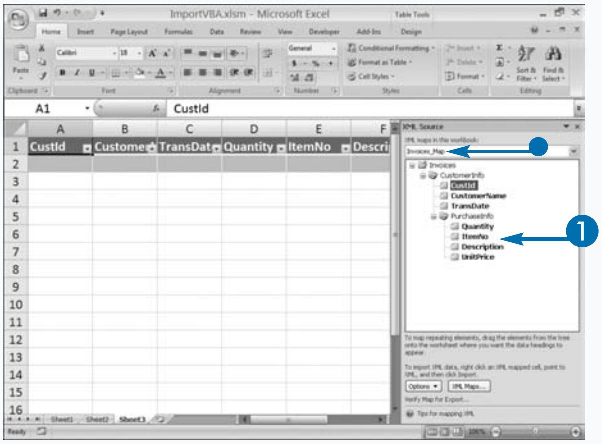
Import XML Files using VBA

1. Create a map and place the elements in your worksheet.

Note: *To learn how to create a map, see the section "Create an XML Map."*

- This is the name of your map.

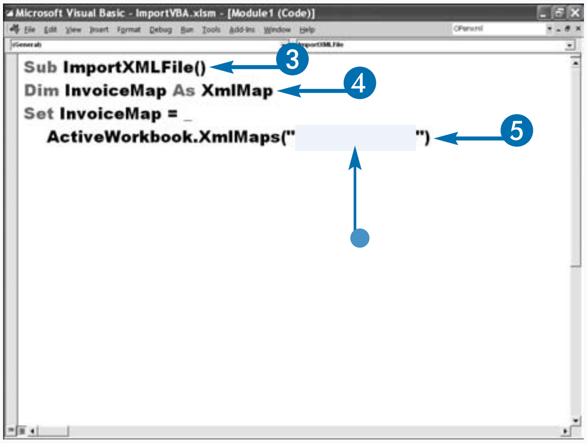
2. Press Alt+F11.


ImportVBA.xlsm - Microsoft Excel
A1
CustId
CustId
CustomerName
TransDate
Quantity
ItemNo
Descri
XML Source
Invoices_Map
Invoices
CustomerInfo
CustId
CustomerName
TransDate
PurchaseInfo
Quantity
ItemNo
Description
UnitPrice
Options
XML Maps...
Sheet1
Sheet2
Sheet3
Ready
1

Excel moves you to the VBE.

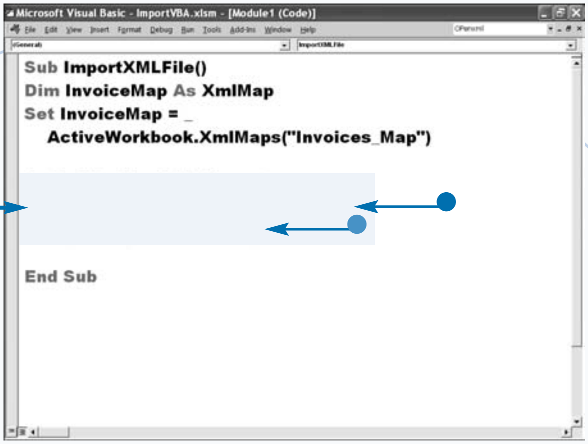
3. Name your procedure.
4. Declare a variable as an `XmlMap` object.
5. Assign your map the `XmlMap` object variable.

- This is the map name.


Microsoft Visual Basic - ImportVBA.xlsm - [Module1 (Code)]
File
Edit
View
Insert
Format
Debug
Run
Tools
Add-Ins
Window
Help
(General)
ImportXMLFile
3
4
5

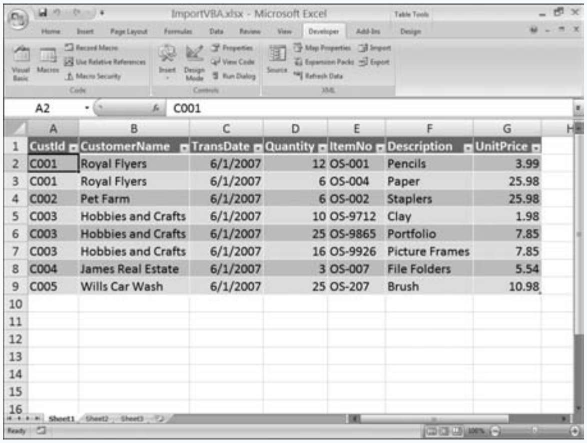
```
Sub ImportXMLFile()
Dim InvoiceMap As XmlMap
Set InvoiceMap = _
    ActiveWorkbook.XmlMaps("            ")
```

6. Create your `XmlImport` command.
   - This is the file location.
   - This is the map you want to use.
7. Press Alt+F11 to switch from the VBE to Excel, and run the macro.



```
Sub ImportXMLFile()
Dim InvoiceMap As XmlMap
Set InvoiceMap = _
    ActiveWorkbook.XmlMaps("Invoices_Map")



End Sub
```

VBA imports your data.



	A	B	C	D	E	F	G
1	CustId	CustomerName	TransDate	Quantity	ItemNo	Description	UnitPrice
2	C001	Royal Flyers	6/1/2007	12	OS-001	Pencils	3.99
3	C001	Royal Flyers	6/1/2007	6	OS-004	Paper	25.98
4	C002	Pet Farm	6/1/2007	6	OS-002	Staplers	25.98
5	C003	Hobbies and Crafts	6/1/2007	10	OS-9712	Clay	1.98
6	C003	Hobbies and Crafts	6/1/2007	25	OS-9865	Portfolio	7.85
7	C003	Hobbies and Crafts	6/1/2007	16	OS-9926	Picture Frames	7.85
8	C004	James Real Estate	6/1/2007	3	OS-007	File Folders	5.54
9	C005	Wills Car Wash	6/1/2007	25	OS-207	Brush	10.98

Extra

As an alternative to the syntax in the example, you can use the following syntax to import an XML file. This syntax uses the `XMLMaps Import` method. The second parameter is `Overwrite`. Setting the `Overwrite` parameter to `False` causes the command to append instead of overwriting data.

Example:

```
Sub
     ActiveWorkbook _
     XMLMaps("Invoices_Map") _
     .Import "C:\XML Files\Invoices.xml", _
     False
End Sub
```

VBA and Excel Object Model Quick Reference

VBA Statements Quick Reference

Legend

Plain courier text = required
[] = optional
| = or
Italics = user-defined
. . . = list of items

File and Folder Handling

STATEMENT	DESCRIPTION
ChDir *path*	Changes to the specified folder location.
ChDrive *drive*	Changes to the specified drive.
Close [*filenumber*]	Closes a file opened by using an Open statement.
FileCopy *source*, *destination*	Copies a file from the source to the specified destination.
Kill *pathname*	Deletes files from a disk. Use wildcards * for multiple characters and ? for single characters.
Lock [#]filenumber[, *recordrange*]	Locks all or a portion of an open file to prevent access by other processes.
MkDir path	Creates a new directory or folder.
Open pathname For mode [Access access][lock] As [#]filenumber [Len=reclength]	Opens the specified file to allow input/output operations.
Print #*filenumber*[, *outputlist*]	Writes display-formatted data sequentially to a file.
Put [#]*filenumber*, [*recnumber*,] *varname*	Writes data contained in a variable to a disk file.
Reset	Closes all files opened using the Open statement.
RmDir *path*	Removes the specified folder.
SetAttr *pathname*, *attributes*	Sets the attribute information for the specified file.
Unlock [#]*filenumber*[, *recordrange*]	Unlocks a file to allow access by other processes.
Width #*filenumber*, *width*	Assigns the output line width for a file opened using the Open statement.
Write #*filenumber*[, outputlist]	Writes data to a sequential text file.

Interaction

STATEMENT	DESCRIPTION
AppActivate *title*[, *wait*]	Activates an application window.
DeleteSetting *appname*, *section*[, *key*]	Deletes a section or key setting from an application’s entry in the Windows Registry
SaveSetting *appname*, *section*, *key*, *setting*	Saves an application entry in the application’s entry in the Windows Registry.
SendKeys *string*[, *wait*]	Sends one or more keystrokes to the active window as if they were typed on the keyboard.

VBA Statements Quick Reference *(continued)*

Program Flow

STATEMENT	DESCRIPTION
[Public | Private] Declare Sub name Lib "libname" [Alias "aliasname"] [([arglist])]	Declares a reference to an external DLL library function.
Do [{While | Until} *condition*] [*statements*] Loop	Repeats a block of statements while or until a condition is true. The condition is checked at the beginning of the loop.
Do [*statements*] Loop [{While | Until} *condition*]	Repeats a block of statements while or until a condition is true. Because the condition is checked at the end of the loop, the block of statements always executes at least once.
Exit Do | For | Function | Property | Sub	Exits the specified Do Loop, For Next, Function, Sub, or Property code.
For Each *element* In *group* [*statements*] Next [*element*]	Repeats a block of statements for each element in an array or collection.
For *counter* = *start* To *end* [Step *step*] [*statements*] Next [*counter*]	Repeats a section of code the specified number of times.
[Public | Private | Friend] [Static] Function *name* [(*arglist*)] [As *type*] [*statements*] [*name* = *expression*] End Function	Defines a procedure that returns a value.

If *condition* Then
[statements]
 	
[ElseIf *condition-n* Then]
[*elseifstatements]*]
 	
[Else [*elsestatements*]]
 	
End If
	Conditionally executes a block of statements based upon the value of an expression.

[Public | Private | Friend] [Static] Property Get *name* [(*arglist*)] [As *type*] [*statements*] [*name* = *expression*] End Property	Declares the name and arguments associated with a procedure.
[Public | Private | Friend] [Static] Property Let *name* ([*arglist*,] *value*) [*statements*] End Property	Declares the name and arguments of a procedure that assigns a value to a property.
[Public | Private | Friend] [Static] Property Set *name* ([*arglist*,] *reference*) [*statements*] End Property	Declares the name and arguments of a procedure that sets a reference to an object.

continued

continued →

VBA and Excel Object Model Quick Reference (continued)

VBA Statements Quick Reference *(continued)*

Program Flow (continued)

STATEMENT	DESCRIPTION
Select Case *testexpression* [Case *expressionlist-n* [*statements-n*]] [Case Else [*elsestatements*]] End Select	Executes one block out of a series of statement blocks depending upon the value of an expression.
[Private | Public | Friend] [Static] Sub name [(*arglist*)] [*statements*] End Sub	Declares the name, arguments, and code that form a Sub procedure.
While *condition* [*statements*] Wend	Executes a block of statements as long as the specified condition is true.
With *object* [*statements*] End With	Executes a block of statements on a single object or on a user-defined data type.

Variable Declaration

STATEMENT	DESCRIPTION
[Public | Private] Const *constname* [As type] = *expression*	Declares a constant value.
Dim [WithEvents] *varname*[([*subscripts*])] [As [New] *type*]	Declares variables and allocates the appropriate storage space.
Friend [WithEvents] *varname*[([*subscripts*])] [As [New] *type*]	Declares a procedure or variable to only have scope in the project where it is defined.
Option Compare {Binary | Text | Database}	Specifies the default comparison method to use when comparing strings.
Option Explicit	Forces declaration of all variables within the module.
Option Private	Indicates that all code within the entire module is Private. This option is used by default. You can overwrite the effects of this option by declaring a specific procedure Public.
Private [WithEvents] *varname*[([*subscripts*])] [As [New] *type*]	Declares variables and procedures to only have scope within the current module.
Public [WithEvents] *varname*[([*subscripts*])] [As [New] *type*]	Declares variables and procedures to have scope within the entire project.

VBA Statements Quick Reference *(continued)*

Variable Declaration (continued)

STATEMENT	DESCRIPTION
ReDim [Preserve] *varname*(*subscripts*) [As *type*]	Changes the dimensions of a dynamic array.
[Private | Public] Type *varname* *elementname* [([*subscripts*])] As *type* [*elementname* [([*subscripts*])] As *type*] … End Type	Defines a custom data type.

VBA Function Quick Reference

Legend

Plain courier text = required

[] = optional

| = or

Italics = user-defined

. . . = list of items

Array Functions

FUNCTION	DESCRIPTION	RETURNS
Array(*arg1*,*arg2*, *arg3*, . . .)	Creates a variant array containing the specified elements.	Variant
LBound(*arrayname*[, *dimension*])	Returns the smallest subscript for the specified array.	Long
UBound(*arrayname*[, *dimension*])	Returns the largest subscript for the specified array.	Long

Data Type Conversion Functions

FUNCTION	DESCRIPTION	RETURNS
Asc(*string*)	Returns the character code of the first letter in a string.	Integer
CBool(*expression*)	Converts an expression to Boolean data type (True or False)	Boolean
CByte(*expression*)	Converts an expression to Byte data type.	Byte
CCur(*expression*)	Converts an expression to Currency data type.	Currency
CDate(*expression*)	Converts an expression to a Date data type.	Date
CDbl(*expression*)	Converts an expression to Double data type.	Double
CDec(*expression*) (Decimal)	Converts an expression to a decimal value.	Variant
Chr(*charactercode*)	Converts the character code to the corresponding character. Chr(9) returns a tab, Chr(34) returns quotation marks, etc.	Variant
CInt(*expression*)	Converts an expression to an Integer data type, rounding any fractional parts.	Integer

continued

continued →

VBA Function Quick Reference *(continued)*

Data Type Conversion Functions (continued)

FUNCTION	DESCRIPTION	RETURNS
CLng(*expression*)	Converts an expression to the Long data type.	Long
CSng(*expression*)	Converts an expression to the Single data type.	Single
CStr(*expression*)	Returns a string containing the specified expression.	String
CVar(*expression*)	Converts any data type to a Variant data type. All numeric values are treated as Double data types and string expressions are treated as String data types.	Variant
Format(*expression*[, format[, *firstdayofweek*[, *firstweekofyear*]]])	Formats the expression using either predefined or user-defined formats.	Variant
FormatCurrency(*Expression*[, *NumDigitsAfterDecimal* [, *IncludeLeadingDigit* [,*UseParensForNegativeNumbers* [, *GroupDigits*]]]])	Formats the expression as a currency value using the system-defined currency symbol.	Currency
FormatDateTime(*Date*[, *NamedFormat*])	Formats an expression as a date and time.	Date
FormatNumber(Expression [, *NumDigitsAfterDecimal* [, *IncludeLeadingDigit* [, *UseParensForNegativeNumbers* [, *GroupDigits*]]]])	Formats the expression as a number.	Mixed
FormatPercent(*Expression* [,*NumDigitsAfterDecimal* [,*IncludeLeadingDigit* [,*UseParensForNegativeNumbers* [,*GroupDigits*]]]])	Returns the expression formatted as a percentage with a trailing % character.	String
Hex(*number*)	Converts a number to a hexadecimal value. Rounds numbers to nearest whole number before converting.	String
Oct(*number*)	Converts a number to an octal value. Rounds numbers to nearest whole number before converting.	Variant (String)
Str(*number*)	Converts a number to a string using the Variant data type.	Variant (String)
Val(*string*)	Returns the numeric portion of a string formatted as a number of the appropriate data type.	Mixed

VBA Function Quick Reference *(continued)*

Date and Time Functions

FUNCTION	DESCRIPTION	RETURNS
Date	Returns the current system date.	Date
DateAdd(*interval*, *number*, *date*)	Returns a date that is the specified interval of time from the original date.	Date
DateDiff(*interval*, *date1*, *date2*[, *firstdayofweek*[, *firstweekofyear*]])	Determines the time interval between two dates.	Long
DatePart(*interval*, *date*[, *firstdayofweek*[, *firstweekofyear*]])	Returns the specified part of a date.	Integer
DateSerial(*year*, *month*, *day*)	Converts the specified date to a serial number.	Date
DateValue(*date*)	Converts a string to a date.	Date
Day(*date*)	Returns a whole number between 1 and 31 representing the day of the month.	Integer
Hour(*time*)	Returns a whole number between 0 and 23 representing the hour of the day.	Integer
Minute(*time*)	Returns a whole number between 0 and 59 representing the minute of the hour.	Integer
Month(*date*)	Returns a whole number between 1 and 12 representing the month of the year.	Integer
Now	Returns the current system date and time.	Date
Second(*time*)	Returns a whole number between 0 and 59 representing the second of the minute.	Integer
Time	Returns the current system time.	Date
Timer	Indicates the number of seconds that have elapsed since midnight	Single
TimeSerial(*hour*, *minute*, *second*)	Creates a time using the specified hour, minute, and second values.	Date
TimeValue(*time*)	Converts a time to the serial number used to store time.	Date
WeekDay(*date,* [*firstdayofweek*])	Returns a whole number representing the first day of the week.	Integer
Year(*date*)	Returns a whole number representing the year portion of a date	Integer

continued →

VBA Function Quick Reference *(continued)*

File and Folder Handling Functions

FUNCTION	DESCRIPTION	RETURNS
CurDir(*drive*)	Returns the current path.	String
Dir[(*pathname*[, *attributes*])]	Returns the name of the file, directory, or folder that matches the specified pattern.	String
EOF(*filenumber*)	Returns -1 when the end of a file has been reached.	Integer
FileAttr(*filenumber*, *returntype*)	Indicates the file mode used for files opened with the Open statement.	Long
FileDateTime(*pathname*)	Indicates the date and time when a file was last modified.	Date
FileLen(*pathname*)	Indicates the length of a file in bytes.	Long
FreeFile(*rangenumber*)	Returns the next file number available for use by the Open statement.	Integer
GetAttr(*pathname*)	Returns a whole number representing the attributes of a file, directory, or folder.	Integer
Input(*number*, [#]*filenumber*)	Returns a string containing the indicated number of characters from the specified file.	String
Loc(*filenumber*)	Indicates the current read/write position in an open file.	Long
LOF(filenumber)	Returns the size in bytes of a file opened using the Long Open statement.	Long
Seek(*filenumber*)	Specifies the current read/write position with a file opened with the Open statement.	Long

Financial Functions

FUNCTION	DESCRIPTION	RETURNS
DDB(*cost*, *salvage*, *life*, *period*[, *factor*])	Specifies the depreciation value for an asset during a specific time frame.	Double
FV(*rate*, *nper*, *pmt*[, *pv*[, *type*]])	Determines the future value of an annuity based on periodic fixed payments.	Double
IPmt(*rate*, *per*, *nper*, *pv*[, *fv*[, *type*]])	Determines the interest payment on an annuity for a specific period of time.	Double
IRR(*values()*, [, *guess*])	Determines the internal rate of returns for a series of cash flows.	Double
MIRR(*values*(), *finance_rate*, *reinvest_rate*)	Returns the modified interest rate of returns for a series of periodic cash flows	Double

VBA Function Quick Reference *(continued)*

Financial Functions (continued)

FUNCTION	DESCRIPTION	RETURNS
NPer(*rate*, *pmt*, *pv*[, *fv*[, *type*]])	Returns the number of periods for an annuity.	Double
NPV(*rate*, *values*())	Returns the net present value of an investment.	Double
Pmt(*rate*, *nper*, *pv*[, *fv*[, *type*]])	Returns the payment amount for an annuity based on fixed payments.	Double
PPmt(*rate*, *per*, *nper*, *pv*[, *fv*[, *type*]])	Returns the principal payment amount for an annuity.	Double
PV(*rate*, *nper*, *pmt*[, *fv*[, *type*]])	Returns the present value of an annuity.	Double
Rate(*nper*, *pmt*, *pv*[, *fv*[, *type*[, *guess*]]])	Returns the interest rate per period for an annuity.	Double
SLN(*cost*, *salvage*, *life*)	Determines the straight-line depreciation of an asset for a single period.	Double
SYD(*cost*, *salvage*, *life*, *period*)	Determines the sum-of-years' digits depreciation of an asset for a specified period.	Double

Information Functions

FUNCTION	DESCRIPTION	RETURNS
CVErr(*errornumber*)	Returns a user-defined error number.	Variant
Error[(*errornumber*)]	Returns the error message for the specified error number.	String
IsArray(*varname*)	Indicates whether a variable contains an array.	Boolean
IsDate(*expression*)	Indicates whether an expression contains a date.	Boolean
IsEmpty(*expression*)	Indicates whether a variable has been initialized.	Boolean
IsError(*expression*)	Indicates whether an expression is an error value.	Boolean
IsMissing(*argname*)	Indicates whether an optional argument was passed to a procedure.	Boolean
IsNull(*expression*)	Indicates whether an expression contains no valid data.	Boolean
IsNumeric(*expression*)	Indicates whether an expression is a number.	Boolean
IsObject(*identifier*)	Indicates whether a variable references an object.	Boolean
TypeName(*varname*)	Specifies the variable type.	String
VarType(*varname*)	Specifies the subtype of a variable.	Integer

continued →

VBA Function Quick Reference *(continued)*

Interaction Functions

FUNCTION	DESCRIPTION	RETURNS
Choose(*index*, *choice-1*, [*choice-2*, ...])	Selects and returns a value from a list of arguments.	Mixed
DoEvents()	Yields execution so the operating system can process other events.	Integer
Iif(*expr*, *truepart*, *falsepart*)	Evaluates the expression and returns either the truepart or falsepart parameter value.	Mixed
InputBox(*prompt*[, *title*] [, *default*] [, *xpos*] [, *ypos*] [, *helpfile*, *context*])	Displays a dialog box prompting the user for input.	String
GetAllSettings(*appname*, *section*)	Returns a list of key settings and their values from the Windows Registry.	Variant
GetObject([*pathname*][, *class*])	Returns a reference to an object provided by an ActiveX Component.	Variant
GetSetting(*appname*, *section*, *key*[, *default*])	Returns a key setting value from an application's entry in the Windows registry.	Variant
MsgBox(*prompt*[, *buttons*] [, *title*] [, *helpfile*, *context*])	Displays a message box and returns a value representing the button pressed by the user	Integer
Partition(*number*, *start*, *stop*, *interval*)	Indicates where a number occurs within a series of ranges.	String
QBColor(*color*)	Returns the RGB color code for the specified color.	Long
Switch(*expr-1*, *value-1*[, *expr-2*, *value-2* ...])	Evaluates a list of expressions and returns the value associated with the first True expression.	Variant
RGB(*red*, *green*, *blue*)	Returns a number representing the RGB color value.	Long

Mathematical Functions

FUNCTION	DESCRIPTION	RETURNS
Abs(*number*)	Returns the absolute value of a number.	Mixed
Atn(*number*)	Returns the arctangent of a number.	Double
Cos(*number*)	Returns the cosine of an angle.	Double

VBA Function Quick Reference *(continued)*

Mathematical Functions (continued)

FUNCTION	DESCRIPTION	RETURNS
Exp(*number*)	Returns the base of the natural logarithms raised to a power.	Double
Fix(*number*)	Returns the integer portion of a number. With negative values, returns the first negative value greater than or equal to the number.	Integer
Int(*number*)	Returns the integer portion of a number. With negative values, returns the first negative number less than or equal to the number	Integer
Log(*number*)	Returns the natural logarithm of a number.	Double
Round(*expression* [, *numdecimalplaces*])	Rounds a number to the specified number of decimal places.	Mixed
Rnd[(*number*)]	Returns a random number between 0 and 1.	Single
Sgn(*number*)	Returns 1 for a number greater than 0, 0 for a value of 0, and -1 for a number less than zero.	Integer
Sin(*number*)	Specifies the sine of an angle.	Double
Sqr(*number*)	Specifies the square root of a number.	Double
Tan(*number*)	Specifies the tangent of an angle.	Double

String Manipulation Functions

FUNCTION	DESCRIPTION	RETURNS
nStr([*start*,]*string1*, *string2* [, *compare*])	Specifies the position of one string within another string.	Long
InStrRev(*stringcheck*, *stringmatch*[, *start*[, *compare*]])	Specifies the position of one string within another starting at the end of the string.	Long
LCase(*string*)	Converts a string to lowercase.	String
Left(*string*, *length*)	Returns the specified number of characters from the left side of a string.	String
Len(*string* | *varname*)	Determines the number of characters in a string.	Long
LTrim(*string*)	Trims spaces from the left side of a string.	String
Mid(*string*, *start*[, *length*])	Returns the specified number of characters from the center of a string.	String
Right(*string*, *length*)	Returns the specified number of characters from the right side of a string.	String
RTrim(*string*)	Trims spaces from the right side of a string.	String
Space(*number*)	Creates a string with the specified number of spaces.	String

continued

continued →

VBA and Excel Object Model Quick Reference (continued)

VBA Function Quick Reference *(continued)*

String Manipulation Functions (continued)

FUNCTION	DESCRIPTION	RETURNS
Spc(*n*)	Positions output when printing to a file.	String
Str(*number*)	Returns a string representation of a number.	String
StrComp(*string1*, *string2*[, *compare*])	Returns a value indicating the result of a string comparison.	Integer
StrConv(*string*, *conversion*, *LCID*)	Converts a string to the specified format.	String
String(*number*, *character*)	Creates a string by repeating a character the specified number of times.	String
Tab[(*n*)]	Positions output when printing to a file.	String
Trim(*string*)	Trims spaces from left and right of a string.	String
UCase(*string*)	Converts a string to uppercase.	String

VBA Function Constants and Characters

vbMsgBoxStyle Constants (MsgBox Function)

CONSTANT	VALUE	DESCRIPTION
vbAbortRetryIgnore	2	Displays Abort, Retry, and Ignore buttons.
vbApplicationModal	0	Creates application modal message box.
vbCritical	16	Displays Critical Message icon.
vbDefaultButton1	0	Makes first button default.
vbDefaultButton2	256	Makes second button default.
vbDefaultButton3	512	Makes third button default.
vbDefaultButton4	768	Makes fourth button default.
vbExclamation	48	Displays Warning Message icon.
vbInformation	64	Displays Information Message icon.
vbMsgBoxHelpButton	16384	Adds a Help button.

vbMsgBoxStyle Constants (MsgBox Function) (continued)

CONSTANT	VALUE	DESCRIPTION
vbMsgBoxRight	524288	Right aligns text in the box.
vbMsgBoxRtlReading	1048576	Used only with Hebrew and Arabic systems for right-to-left reading.
vbMsgBoxSetForeground	65536	Makes message box the foreground window.
vbOKCancel	1	Displays OK and Cancel buttons.
vbOKOnly	0	Displays only the OK button.
vbQuestion	32	Displays Warning Query icon.
vbRetryCancel	5	Displays Retry and Cancel buttons.
vbSystemModal	4096	Creates a system modal message box.
vbYesNo	4	Displays Yes and No buttons.
vbYesNoCancel	3	Displays Yes, No, and Cancel buttons.

vbDayOfWeek Constants

CONSTANT	VALUE	DESCRIPTION
vbUseSystemDayofWeek	0	Uses the system defined first day of week.
vbSunday	1	Sunday (default).
vbMonday	2	Monday.
vbTuesday	3	Tuesday.
vbWednesday	4	Wednesday.
vbThursday	5	Thursday.
vbFriday	6	Friday.
vbSaturday	7	Saturday.

vbFirstWeekOfYear Constants

CONSTANT	VALUE	DESCRIPTION
vbUseSystem	0	Uses system defined first week of year.
vbFirstJan1	1	Starts with week in which January 1 occurs (default).
vbFirstFourDays	2	Starts with the first week that has at least four days in the new year.
vbFirstFullWeek	3	Starts with first full week of the year.

continued

VBA and Excel Object Model Quick Reference (continued)

VBA Function Constants and Characters *(continued)*

Format Function Characters

DATE/TIME CHARACTERS	DISPLAYS
d	Day with no leading zero.
ddd	Three-letter abbreviation of day (Sun. – Sat.).
dddd	Full day name (Sunday).
ddddd	Complete date using short date format.
dddddd	Complete date using long date format.
w	Day of week as number (1 for Sunday).
ww	Week of year as number.
m	Month with no leading zero.
mmm	Three letter abbreviation of month (Jan.-Dec.).
mmmm	Complete month name.
q	Quarter of year.
y	Day of year as number.
yy	Year as 2-digit number.
yyyy	Year as 4-digit number.
h	Hour with no leading zero.
n	Minutes with no leading zero.
s	Seconds with no leading zero.
ttttt	Complete time using system time format.
c	Date as **dddddd** and time as **ttttt**.

Format Function Predefined Formats

FORMAT	DESCRIPTION
General Date	Uses general date format.
Long Date	Uses system-defined long date, such as Tuesday, August 7, 2007.
Medium Date	Uses the medium date format, such as 07-Aug-07.
Short Date	Uses system-defined short date, such as 8/7/2007.
Long Time	Uses system-defined long time, such as 5:45:30 P.M.
Medium Time	Uses the medium time format, such as 05:45 P.M.
Short Time	Uses the short time format, such as 17:45.

VBA Function Constants and Characters *(continued)*

Format Function Predefined Formats (continued)

FORMAT	DESCRIPTION
General Number	Uses the general number format.
Currency	Places the appropriate currency symbol in front of the number.
Fixed	Uses a fixed decimal format.
Standard	Uses standard formatting.
Percent	Converts the expression to a percentage.
Scientific	Displays the expression using scientific notation.
Yes/No	Converts the expression to a Yes or No value.
True/False	Converts the expression to a True or False value.
On/Off	Converts the expression to an On or Off value.

Excel Object Model Constants

XlColumnDataType Constants

CONSTANT	VALUE	DESCRIPTION
xlDMYFormat	4	DMY format date.
xlDYMFormat	7	DYM format date.
xlEMDFormat	10	EMD format date.
xlGeneralFormat	1	General format.
xlMDYFormat	3	MDY format date.
xlMYDFormat	6	MYD format date.
xlSkipColumn	9	Skip Column.
xlTextFormat	2	Text format.
xlYDMFormat	8	YDM format date.
xlYMDFormat	5	YMD format date.

XlFileFormat Constants

CONSTANT	VALUE	DESCRIPTION
xlAddIn	18	Excel add-in.
xlAddIn8	18	Excel 2007 Add-In
xlCSV	6	Comma-separated values format.
xlCSVMac	22	Macintosh comma-separated values format.

continued

continued →

Excel Object Model Constants *(continued)*

XlFileFormat Constants (continued)

CONSTANT	VALUE	DESCRIPTION
xlCSVMSDOS	24	MSDOS comma-separated values format.
xlCSVWindows	23	MS Windows comma-separated values format.
xlCurrentPlatformText	-4158	Text file based on current operating system.
xlDBF2	7	DBase II format.
xlDBF3	8	DBase III format.
xlDBF4	11	DBase IV format.
xlDIF	9	Data interchange format.
xlExcel12	50	Excel 12 format.
xlExcel2	16	Excel 2
xlExcel2FarEast	27	Excel 2.0 format – Far East version.
xlExcel3	29	Excel 3.0 format.
xlExcel4	33	Excel 4.0 format.
xlExcel4Workbook	35	Excel 4.0 workbook format.
xlExcel5	39	Excel 5.0 format.
xlExcel7	39	Excel 97 format.
xlExcel9597	43	Excel 95 – 97 format.
xlHtml	44	HTML format.
xlIntlAddIn	26	Excel international Add-in.
xlIntlMacro	25	Excel international macro.
xlOpenXMLAddin	55	Open XML Add-In.
xlOpenXMLTemplate	54	Open XML Template.
xlOpemXMLTemplateMacroEnabled	53	Open XML Template Macro Enabled.
xlOpenXMLWorkbook	51	Open XML Workbook.
xlOpenXMLWorkbookzMacroEnabled	52	Open XML Workbook Enabled.
xlSYLK	2	Symbolic link format.
xlTemplate	17	Template file format.
xlTemplate8	17	Template.
xlTextMac	19	Macintosh text file format.
xlTextMSDOS	21	MSDOS text file format.
xlTextPrinter	36	Text file created for a printer (.prn).
xlTextWindows	20	MS Window text file format.

XlFileFormat Constants (continued)

CONSTANT	VALUE	DESCRIPTION
xlUnicodeText	42	Unicode text file format.
xlWebArchive	45	Web archive format (.mht).
xlWJ2WD1	14	WJ2WD1
xlWJ3	40	WJ3
xlWJ3FM3	41	WJ3FJ3
xlWK1	5	Lotus 2.x format.
xlWK1ALL	31	Lotus 2.x .all format.
xlWK1FMT	30	Lotus 2.x .fmt format.
xlWK3	15	Lotus 3.x format.
xlWK3FM3	32	Lotus 3.x and Lotus 1-2-3 for Windows format.
xlWK4	38	Lotus 4.0 format.
xlWKS	4	MS Works file format.
xlWorkBookDefault	51	Workbook default
xlWorkbookNormal	-4143	Excel workbook format.
xlWorks2FarEast	28	MS Works file – Far East format.
xlWQ1	34	Quattro Pro for MSDOS format.
xlXMLSpreadsheet	46	XML format.

MsoFileType Constants

CONSTANT	VALUE	DESCRIPTION
msoFileTypeAllFiles	1	All file types.
msoFileTypeBinders	6	Microsoft Office Binder file.
msoFileTypeCalendarItem	11	Microsoft Outlook Calendar item.
msoFileTypeContactItem	12	Microsoft Outlook Contact item.
msoFileTypeDatabases	7	Database files.
msoFileTypeDataConnectionFiles	17	Database connection files.
msoFileTypeDesignerFiles	22	Designer files.
msoFileTypeDocumentImagingFiles	20	Document imaging files.
msoFileTypeExcelWorkbooks	4	Microsoft Excel Workbooks.
msoFileTypeJournalItem	14	Journal items.
msoFileTypeMailItem	10	Microsoft Outlook Mail message.
msoFileTypeNoteItem	13	Microsoft Outlook Note item.
msoFileTypeOfficeFiles	2	All Microsoft Office file types.

continued

continued →

Excel Object Model Constants *(continued)*

MsoFileTypeConstant (continued)

CONSTANT	VALUE	DESCRIPTION
msoFileTypeOutlookItems	9	Microsoft Outlook files.
msoFileTypePhotoDrawFiles	16	Microsoft PhotoDraw files.
msoFileTypePowerPointPresentations	5	Microsoft PowerPoint files.
msoFileTypeProjectFiles	19	Microsoft Project files.
msoFileTypePublisherFiles	18	Microsoft Publisher files.
msoFileTypeTaskItem	15	Microsoft Outlook Task item.
msoFileTypeTemplates	8	Template files.
msoFileTypeVisioFiles	21	Visio files.
msoFileTypeWebPages	23	Web pages including .htm, .asp, and .mht files.
msoFileTypeWordDocuments	3	Microsoft Word documents.

XlChartType Constants

CONSTANT	VALUE	CHART TYPE
xl3DArea	-4098	3D Area.
xl3DAreaStacked	78	3D Stacked Area.
xl3DAreaStacked100	79	100% Stacked Area.
xl3DBarClustered	60	3D Clustered Bar.
xl3DBarStacked	61	3D Stacked Bar.
xl3DBarStacked100	62	3D 100% Stacked Bar.
xl3DColumn	-4100	3D Column.
xl3DColumnClustered	54	3D Clustered Column.
xl3DColumnStacked	55	3D Stacked Column.
xl3DColumnStacked100	56	3D 100% Stacked Column.
xl3DLine	-4101	3D Line.
xl3DPie	-4102	3D Pie.
xl3DPieExploded	70	Exploded 3D Pie.
xlArea	1	Area.
xlAreaStacked	76	Stacked Area.
xlAreaStacked100	77	100% Stacked Area.
xlBarClustered	57	Clustered Bar.

XlChartType Constants (continued)

CONSTANT	VALUE	CHART TYPE
xlBarOfPie	71	Bar of Pie.
xlBarStacked	58	Stacked Bar.
xlBarStacked100	59	100% Stacked Bar.
xlBubble	15	Bubble.
xlBubble3DEffec	87	Bubble with 3D effects.
xlColumnClustered	51	Clustered Column.
xlColumnStacked	52	Stacked Column.
xlColumnStacked100	53	100% Stacked Column.
xlConeBarClustered	102	Clustered Cone Bar.
xlConeBarStacked	103	Stacked Cone Bar.
xlConeBarStacked100	104	100% Stacked Cone Bar.
xlConeCol	105	3D Cone Column.
xlConeColClustered	99	Clustered Cone Column.
xlConeColStacked	100	Stacked Cone Column.
xlConeColStacked100	101	100% Stacked Cone Column.
xlCylinderBarClustered	95	Clustered Cylinder Bar.
xlCylinderBarStacked	96	Stacked Cylinder Bar.
xlCylinderBarStacked100	97	100% Stacked Cylinder Bar.
xlCylinderCol	98	3D Cylinder Column.
xlCylinderColClustered	92	Clustered Cone Column.
xlCylinderColStacked	93	Stacked Cone Column.
xlCylinderColStacked100	94	100% Stacked Cylinder Column.
xlDoughnut	-4120	Doughnut.
xlDoughnutExploded	80	Exploded Doughnut.
xlLine	4	Line.
xlLineMarkers	65	Line with Markers.
xlLineMarkersStacked	66	Stacked Line with Markers.
xlLineMarkersStacked100	67	100% Stacked Line with Markers.
xlLineStacked	63	Stacked Line.
xlLineStacked100	64	100% Stacked Line.
xlPie	5	Pie.
xlPieExploded	69	Exploded Pie.
xlPieOfPie	68	Pie of Pie.
xlPyramidBarClustered	109	Clustered Pyramid Bar.

continued

continued →

Excel Object Model Constants *(continued)*

XlChartType Constants (continued)

CONSTANT	VALUE	CHART TYPE
xlPyramidBarStacked	110	Stacked Pyramid Bar.
xlPyramidBarStacked100	111	100% Stacked Pyramid Bar.
xlPyramidCol	112	3D Pyramid Column.
xlPyramidColClustered	106	Clustered Pyramid Column.
xlPyramidColStacked	107	Stacked Pyramid Column.
xlPyramidColStacked100	108	100% Stacked Pyramid Column.
xlRadar	-4151	Radar.
xlRadarFilled	82	Filled Radar.
xlRadarMarkers	81	Radar with Data Markers.
xlStockHLC	88	High-Low-Close.
xlStockOHLC	89	Open-High-Low-Close.
xlStockVHLC	90	Volume-High-Low-Close.
xlStockVOHLC	91	Volume-Open-High-Low-Close.
xlSurface	83	3D Surface.
xlSurfaceTopView	85	Top View Surface.
xlSurfaceTopViewWireframe	86	Top View Wireframe Surface.
xlSurfaceWireframe	84	3D Surface Wireframe.
xlXYScatter	-4169	Scatter.
xlXYScatterLines	74	Scatter with Lines.
xlXYScatterLinesNoMarkers	75	Scatter with Lines and No Data Markers.
xlXYScatterSmooth	72	Scatter with Smoothed Lines.
xlXYScatterSmoothNoMarkers	73	Scatter with Smoothed Lines and No Data Markers.

XlLineStyle Constants

CONSTANT	VALUE	DESCRIPTION
xlContinuous	1	Continuous solid line.
xlDash	-4155	Dashed line.
xlDashDot	4	Line with the pattern dash dot.
xlDashDotDot	5	Line with the pattern dash dot dot.
xlDot	-4118	Dotted line.

Excel Object Model Constants *(continued)*

XlLineStyle Constants (continued)

CONSTANT	VALUE	DESCRIPTION
xlDouble	-4119	Double solid line.
xlSlantDashDot	13	Slanted line with the pattern dash dot.
xlineStyleNone	-4142	No line.

XlBorderWeight Constants

CONSTANT	VALUE	DESCRIPTION
xlHairline	1	Creates a very thin line.
xlMedium	-4138	Creates a medium width line.
xlThick	4	Creates a thick line.
xlThin	2	Creates a thin line.

XlPattern Constants

CONSTANT	VALUE	DESCRIPTION
xlPatternAutomatic	-4105	System default.
xlPatternChecker	9	Checkered pattern.
xlPatternCrissCross	16	Criss-cross pattern.
xlPatternDown	-4121	Downward pattern.
xlPatternGray25	-4124	25% gray pattern.
xlPatternGray50	-4125	50% gray pattern.
xlPatternGray75	-4126	75% gray pattern.
xlPatternGrid	15	Grid pattern.
xlPatternHorizontal	-4128	Horizontal pattern.
xlPatternLightHorizontal	11	Light horizontal pattern.
xlPatternLightVertical	12	Light vertical pattern.
xlPatternLightDown	13	Light downward pattern.
xlPatternLightUp	14	Light upward pattern.
xlPatternNone	-4142	No pattern.
xlPatternSemiGray75	10	75% semi-gray pattern.
xlPatternSolid	1	Solid color, no pattern.
xlPatternUp	-4162	Upward pattern.
xlPatternVertical	-4166	Vertical pattern.

Ribbon Controls Quick Reference

XML Controls

XML controls specific to the Ribbon.

CONTROL	DESCRIPTION	COMMON ATTRIBUTES	CHILDREN
customUI	The root tag for Ribbon customizations.	None	commands, ribbon
commands	Globally repurposed commands.	None	command
command	Represents the command that you are repurposing.	enabled, getEnabled, idMso (required), onAction	contextualTabs, officeMenu, qat, tabs
contextualTabs	The contextual tabs that display in Excel. For example, the Chart tools.	None	tabSet
tabSet	A collection of tab controls.	getVisible, idMso (required), visible	tab
qat	The Quick Access Toolbar. Used only in the start from scratch mode.	None	documentControls, sharedControls
sharedControls	Controls shared across documents. In general, you should use documentControls, not sharedControls.	None	button, control, separator
documentControls	Controls specific to a document.	None	button, control, separator
officeMenu	Microsoft Office menu controls.	None	button, checkbox, control, dynamicMenu, gallery, menu, menuSeparator, splitButton, toggleButton
tabs	Container for tab controls.	None	tab
tab	A tab on the Ribbon.	getKeytip, getLabel, getVisible, id, idMso, idQ, insertAfterMso, insertAfterQ, insertBeforeMso, insertBeforeQ, keytip, label, tag, visible	group
group	A group on a tab on the Ribbon.	getImage, getImageMso, getKeytip, getLabel, getScreentip, getSupertip, getVisible, id, idMso, idQ, image, imageMso, insertAfterMso, insertAfterQ, insertBeforeMso, insertBeforeQ, keytip, label, screentip, supertip, visible	box, button, buttonGroup, checkBox, comboBox, control, dialogBoxLauncher, dropDown, editBox, gallery, labelControl, menu, separator, splitButton, toggleButton

XML Basic Controls

CONTROL	DESCRIPTION	COMMON ATTRIBUTES	CHILDREN
box	Use to arrange controls within a group.	getVisible, id, idQ, insertAfterMso, insertAfterQ, insertBeforeMso, insertBeforeQ, visible	box, button, buttonGroup, checkBox, comboBox, control, dropdown, dynamicMenu, editBox, gallery, labelControl, menu, splitButton, toggleButton
button	Use to represent a button control.	description, enabled, getDescription, getEnabled, getImage, getImageMso, getKeytip, getLabel, getScreentip, getShowImage, getShowLabel, getSize, getSupertip, getVisible, id, idMso, idQ, image, imageMso, insertAfterMso, insertAfterQ, insertBeforeMso, insertBeforeQ, keytip, label, onAction, screentip, showImage, showLabel, size, supertip, tag, visible	None
buttonGroup	Use to create a grouping of buttons.	getVisible, id, idQ, insertAfterMso, insertAfterQ, insertBeforeMso, insertBeforeQ, visible	button, control, dynamicMenu, gallery, menu, splitButton, toggleButton
checkbox	Use to create a check box control.	description, enabled, getDescription, getEnabled, getKeytip, getLabel, getScreentip, getSupertip, getVisible, id, idMso, idQ, insertAfterMso, insertAfterQ, insertBeforeMso, insertBeforeQ, keytip, label, onAction, screentip, supertip, tag, visible	None
comboBox	Use to create a combo box control.	enabled, getEnabled, getImage, getImageMso, getKeytip, getLabel, getScreentip, getShowImage, getShowLabel, getSupertip, getVisible, id, idMso, idQ, image, imageMso, insertAfterMso, insertAfterQ, insertBeforeMso, insertBeforeQ, label, screentip, showImage, showLabel, supertip, tag, visible, Shared with editBox: getText, maxLength, onChange, sizeString	item
dialogBox Launcher	Use to create a dialog box launcher for a group. A group control can only have one dialog box launcher, the control must contain a button control, and must be the final element in the group element.	None	button (required)

continued

continued

Ribbon Controls Quick Reference (continued)

XML Basic Controls *(continued)*

CONTROL	DESCRIPTION	COMMON ATTRIBUTES	CHILDREN
dropdown	Use to create a drop-down list box.	enabled, getEnabled, getImage, getImageMso, getKeytip, getLabel, getScreentip, getShowImage, getShowLabel, getSupertip, getVisible, id, idMso, idQ, image, imageMso, insertAfterMso, insertAfterQ, insertBeforeMso, insertBeforeQ, keytip, label, onAction, screentip, showImage, showLabel, supertip, tag, visible Shared with comboBox: getItemCount, getItemID, getItemImage, getItemLabel, getItemScreentip, getItemSupertip, showItemImage, Shared with editBox: sizeString	item
dynamicMenu	Use to create a menu at run time.	description, enabled, getDescription, getEnabled, getImage, getImageMso, getKeytip, getLabel, getScreentip, getShowImage, getShowLabel, getSize, getSupertip, getVisible, id, idMso, idQ, image, imageMso, insertAfterMso, insertAfterQ, insertBeforeMso, insertBeforeQ, keytip, label, screentip, showImage, showLabel, supertip, tag, visible	Same as a menu, but is populated by using the getContent callback.
editBox	Use to create an edit box control.	enabled, getEnabled, getImage, getImageMso, getKeytip, getLabel, getScreentip, getShowImage, getShowLabel, getSupertip, getVisible, id, idMso, idQ, image, imageMso, insertAfterMso, insertAfterQ, insertBeforeMso, insertBeforeQ, keytip, label, screentip, showImage, showLabel, supertip, tag, visible	None
gallery	Use to create a gallery control.	description, enabled, getDescription, getEnabled, getImage, getImageMso, getKeytip, getLabel, getScreentip, getShowImage, getShowLabel, getSize,getSupertip, getVisible, id, idMso, idQ, image, imageMso, insertAfterMso, insertAfterQ, insertBeforeMso, insertBeforeQ, keytip, label, onAction, screentip, showImage, showLabel, size, supertip, tag, visible, Shared with comboBox: getItemCount, getItemID, getItemImage, getItemLabel, getItemScreentip, getItemSupertip, showItemImage, showItemLabel, Shared with dropDown: getSelectedItemID, getSelectedItem Index Shared with editBox: sizeString	item, button. Buttons must be listed after the items, and all buttons appear at the bottom of the gallery.
item	A static gallery, dropDown, or comboBox item. If you specify static items, you cannot also specify dynamic items.	id, image, imageMso, label, screentip, supertip	None

XML Basic Controls *(continued)*

CONTROL	DESCRIPTION	COMMON ATTRIBUTES	CHILDREN
labelControl	Use to create a label control.	enabled, getEnabled, getLabel, getScreentip, getShowLabel, getSupertip, getVisible, id, idMso, idQ, insertAfterMso, insertAfterQ, insertBeforeMso, insertBeforeQ, label, screentip, showLabel, supertip, tag, visible	None
menu	Use to create a menu control.	description, enabled, getDescription, getEnabled, getImage, getImageMso, getKeytip, getLabel, getScreentip, getShowImage, getShowLabel, getSize, getSupertip, getVisible, id, idMso, idQ, image, imageMso, insertAfterMso, insertAfterQ, insertBeforeMso, insertBeforeQ, keytip, label, screentip, showImage, showLabel, size, supertip, tag, visible	button, checkBox, control, dynamicMenu, gallery, menu, menuSeparator, splitButton, toggleButton
menu Separator	Use to create a separator line (which can optionally include a text label) between menu items.	id, idQ, insertAfterMso, insertAfterQ, insertBeforeMso, insertBeforeQ	None
separator	Use to create a separator line between controls.	getVisible, id, idQ, insertAfterMso, insertAfterQ, insertBeforeMso, insertBeforeQ, visible	None
splitButton	Use to create a split button control.	enabled, getEnabled, getKeytip, getShowLabel, getSize, getSupertip, getVisible, id, idMso, idQ, insertAfterMso, insertAfterQ, insertBeforeMso, insertBeforeQ, keytip, showLabel (determines whether the button or toggle button control displays its label), size, supertip, tag, visible	button or toggleButton (required, only one permitted, and must appear before the menu): The main button for the split button control menu (required, and only one permitted): The menu of a split button control.
toggleButton	Use to create a toggle button control.	description, enabled, getDescription, getEnabled, getImage, getImageMso, getKeytip, getLabel, getPressed, getScreentip, getShowImage, getShowLabel, getSize, getSupertip, getVisible, id, idMso, idQ, image, imageMso, insertAfterMso, insertAfterQ, insertBeforeMso, insertBeforeQ, keytip, label, onAction, screentip, showImage, showLabel, size, supertip, tag, visible	None

continued

Ribbon Controls Quick Reference (continued)

Attributes and Methods of Ribbon Controls

The following tables list the attributes and methods related to specific ribbon controls.

CONTROL	ATTRIBUTE OR METHOD	TYPE OR ACTION	DESCRIPTION
customUI	xmlns	String	You must set xmlns to http://schemas.microsoft.com/office/2006/01/customui
customUI	onLoad	callback	As the Ribbon load passes a Ribbon parameter to the callback procedure. This enables the associated code to store a reference to the Ribbon for later use.
customUI	loadImage	callback	Use to create a procedure to load all of the images required by the Ribbon.

CONTROL	ATTRIBUTE	VALUES	DESCRIPTION
ribbon	startFromScratch	True, False, 1, 0	Set to True, to hide built-in Ribbon tabs and display a minimal File menu.

CONTROL	ATTRIBUTE	VALUES	DESCRIPTION
box	boxStyle	Horizontal, Vertical	Sets the flow of the controls inside a box.

CONTROL	ATTRIBUTE	TYPE OR ACTION	DESCRIPTION
checkBox	getPressed	callback	Use to specify whether the checkBox control is pressed.

CONTROL	METHOD	ATTRIBUTE OR METHOD	DESCRIPTION
comboBox	getItemCount	callback	Returns the number of items in a comboBox.
comboBox	getItemID	callback	Returns the ID of for the item.
comboBox	getItemImage	callback	Returns the image for the item.
comboBox	getItemLabel	callback	Returns the label of for the item.
comboBox	getItemScreentip	callback	Returns the ScreenTip of for the item.
comboBox	getItemSupertip	callback	Returns the Enhanced ScreenTip for the item.
comboBox	showItemImage	True, False, 1, 0	Specifies whether to display the item image.

CONTROL	METHOD	ACTION	DESCRIPTION
dropdown	getSelectedItemID	callback	Asks for the item that should be selected by ID. Specify either this attribute or the getSelectedItemIndex attribute, but not both.
dropdown	getSelectedItemIndex	callback	Asks for the item that should be selected by index. Specify either this attribute or the getSelectedItemId attribute, but not both.
dropdown	showItemLabel	True, False, 1, 0	Indicates whether items should display labels.

Attributes and Methods of Ribbon Controls *(continued)*

CONTROL	METHOD	ACTION	DESCRIPTION
dynamicMenu	getContent	callback	Returns an XML string that contains the contents of the dynamic menu.

CONTROL	ATTRIBUTE OR METHOD	TYPE OR ACTION	DESCRIPTION
editBox	getText	callback	Returns the text that displays in the edit box.
editBox	maxLength	Integer	The maximum number of characters that a user can type in a edit box.
editBox	onChange	callback	Called when the value in the edit box changes.
editBox	sizeString	String	A string, such as “wwwwwwwwww”. Determines the size of an edit box.

CONTROL	ATTRIBUTE OR METHOD	TYPE OR ACTION	DESCRIPTION
gallery	columns	Integer	The number of columns in a gallery.
gallery	getItemHeight	callback	Requests the height of items, in pixels.
gallery	getItemWidth	callback	Requests the width of items, in pixels.
gallery	itemHeight	Integer	The height of items, in pixels.
gallery	itemWidth	Integer	The width of items, in pixels.
gallery	rows	Integer	The number of rows in a gallery.

CONTROL	ATTRIBUTE	VALUES	DESCRIPTION
menu	itemSize	Normal, Large	The size of an item. The Description property shows for Large menu items.

CONTROL	ATTRIBUTE	TYPE OR ACTION	DESCRIPTION
menuSeparator	title	String	The text for this separator.
menuSeparator	getTitle	callback	Callback for this separator’s text.

CONTROL	ATTRIBUTE	TYPE OR ACTION	DESCRIPTION
toggleButton	getPressed	callback	Enables you to specify whether the toggle button control is pressed.

continued →

Ribbon Controls Quick Reference (continued)

Callbacks

The following table lists all of the callbacks used by RibbonX.

CONTROL	CALLBACK NAME	SIGNATURES
(several controls)	getDescription	Sub GetDescription (control As IRibbonControl, ByRef description)
(several controls)	getEnabled	Sub GetEnabled (control As IRibbonControl, ByRef enabled)
(several controls)	getImage	Sub GetImage (control As IRibbonControl, ByRef image)
(several controls)	getImageMso	Sub GetImageMso (control As IRibbonControl, ByRef imageMso)
(several controls)	getLabel	Sub GetLabel (control As IRibbonControl, ByRef label)
(several controls)	getKeytip	Sub GetKeytip (control As IRibbonControl, ByRef label)
(several controls)	getSize	Sub GetSize (control As IRibbonControl, ByRef size)
(several controls)	getScreentip	Sub GetScreentip (control As IRibbonControl, ByRef screentip)
(several controls)	getSupertip	Sub GetSupertip (control As IRibbonControl, ByRef screentip)
(several controls)	getVisible	Sub GetVisible (control As IRibbonControl, ByRef visible)
button	getShowImage	Sub GetShowImage (control As IRibbonControl, ByRef showImage)
button	getShowLabel	Sub GetShowLabel (control As IRibbonControl, ByRef showLabel)
button	onAction – repurposed	Sub OnAction (control As IRibbonControl, byRef CancelDefault)
button	onAction	Sub OnAction (control As IRibbonControl)
checkBox	getPressed	Sub GetPressed (control As IRibbonControl, ByRef returnValue)
checkBox	onAction	Sub OnAction (control As IRibbonControl, pressed As Boolean)(pvarfPressed)
comboBox	getItemCount	Sub GetItemCount (control As IRibbonControl, ByRef count)
comboBox	getItemID	Sub GetItemID (control As IRibbonControl, index As Integer, ByRef id)
comboBox	getItemImage	Sub GetItemImage (control As IRibbonControl, index As Integer, ByRef image)
comboBox	getItemLabel	Sub GetItemLabel (control As IRibbonControl, index As Integer, ByRef label)
comboBox	getItemScreenTip	Sub GetItemScreenTip (control As IRibbonControl, index As Integer, ByRef screentip)
comboBox	getItemSuperTip	Sub GetItemSuperTip (control As IRibbonControl, index As Integer, ByRef supertip)
comboBox	getText	Sub GetText (control As IRibbonControl, ByRef text)
comboBox	onChange	Sub OnChange (control As IRibbonControl, text As String)
customUI	loadImage	Sub LoadImage (imageId As string, ByRef image)
customUI	onLoad	Sub OnLoad (ribbon As IRibbonUI)
dropDown	getItemCount	Sub GetItemCount (control As IRibbonControl, ByRef count)

Callbacks *(continued)*

CONTROL	CALLBACK NAME	SIGNATURES
dropDown	getItemID	Sub GetItemID (control As IRibbonControl, index As Integer, ByRef id)
dropDown	getItemImage	Sub GetItemImage (control As IRibbonControl, index As Integer, ByRef image)
dropDown	getItemLabel	Sub GetItemLabel (control As IRibbonControl, index As Integer, ByRef label)
dropDown	getItemScreenTip	Sub GetItemScreenTip (control As IRibbonControl, index As Integer, ByRef screenTip)
dropDown	getItemSuperTip	Sub GetItemSuperTip (control As IRibbonControl, index As Integer, ByRef superTip)
dropDown	getSelectedItemID	Sub GetSelectedItemID (control As IRibbonControl, ByRef index)
dropDown	getSelectedItemIndex	Sub GetSelectedItemIndex (control As IRibbonControl, ByRef index)
dropDown	onAction	Sub OnAction (control As IRibbonControl, selectedId As String, selectedIndex As Integer)
dynamicMenu	getContent	Sub GetContent (control As IRibbonControl, ByRef content)
editBox	getText	Sub GetText (control As IRibbonControl, ByRef text)
editBox	onChange	Sub OnChange (control As IRibbonControl, text As String)
gallery	getItemCount	Sub GetItemCount (control As IRibbonControl, ByRef count)
gallery	getItemHeight	Sub getItemHeight (control As IRibbonControl, ByRef height)
gallery	getItemID	Sub GetItemID (control As IRibbonControl, index As Integer, ByRef id)
gallery	getItemImage	Sub GetItemImage (control As IRibbonControl, index As Integer, ByRef image)
gallery	getItemLabel	Sub GetItemLabel (control As IRibbonControl, index As Integer, ByRef label)
gallery	getItemScreenTip	Sub GetItemScreenTip (control As IRibbonControl, index as Integer, ByRef screen)
gallery	getItemSuperTip	Sub GetItemSuperTip (control As IRibbonControl, index as Integer, ByRef screen)
gallery	getItemWidth	Sub getItemWidth (control As IRibbonControl, ByRef width)
gallery	getSelectedItemID	Sub GetSelectedItemID (control As IRibbonControl, ByRef index)
gallery	getSelectedItemIndex	Sub GetSelectedItemIndex (control As IRibbonControl, ByRef index)
gallery	onAction	Sub OnAction (control As IRibbonControl, selectedId As String, selectedIndex As Integer)
menuSeparator	getTitle	Sub GetTitle (control As IRibbonControl, ByRef title)
toggleButton	getPressed	Sub GetPressed (control As IRibbonControl, ByRef returnValue)
toggleButton	onAction	Sub OnAction (control As IRibbonControl, pressed As Boolean, byRef cancelDefault)
toggleButton	onAction	Sub OnAction (control As IRibbonControl, pressed As Boolean)

continued →

Ribbon Controls Quick Reference (continued)

Attributes

The following table lists all of the Ribbon attributes used by RibbonX.

ATTRIBUTE	TYPE OR VALUE	DESCRIPTION
description	String	When the itemSize attribute is set to large, sets the description text that displays in menus.
enabled	true, false, 0, 1	Enables controls.
getContent	callback	Retrieves XML content that describes the menu. Used with a dynamic menu.
getDescription	callback	Returns the control description.
getEnabled	callback	Returns the control enabled state.
getImage	callback	Returns the image.
getImageMso	callback	Uses a control ID to returns a built-in control icon.
getItemCount	callback	Returns the number of items in a combo box, drop-down list, or gallery.
getItemID	callback	Returns the ID for a specific item in a combo box, drop-down list, or gallery.
getItemImage	callback	Returns the image for a specific item in a combo box, drop-down list, or gallery.
getItemLabel	callback	Returns the label for a specific item in a combo box, drop-down list, or gallery.
getItemScreentip	callback	Returns the ScreenTip for a specific item in a combo box, drop-down list, or gallery.
getItemSupertip	callback	Returns the Enhanced ScreenTip for a specific item in a combo box, drop-down list, or gallery.
getKeytip	callback	Returns the KeyTip.
getLabel	callback	Returns the label.
getPressed	callback	When used with a toggle button, gets a value that indicates whether the state is pressed or not pressed. When used with a checkbox, gets a value that indicates whether the state is selected or cleared.
getScreentip	callback	Returns the ScreenTip.
getSelectedItemID	callback	For a drop-down list or gallery, gets the ID of the selected item.
getSelectedItemIndex	callback	For a drop-down list or gallery, gets the index of the selected item.
getShowImage	callback	Returns a value that sets whether to display the control image.
getShowLabel	callback	Returns a value that sets whether to display the control label.
getSize	callback	Returns a value that sets the size of a control (normal or large).
getSupertip	callback	Returns a value that sets the Enhanced ScreenTip for a control.
getText	callback	For a text box or edit box, gets the text to display in the edit portion of the control.

Attributes *(continued)*

ATTRIBUTE	TYPE OR VALUE	DESCRIPTION
getTitle	callback	For a menu separator, sets the text to display (rather than a horizontal line).
getVisible	callback	Returns the value that determines whether the control is visible.
id	String	A user-defined unique identifier for a control. If you define an id, do not assign an idMso or an idQ.
idMso	control id	Built-in control ID. If you define an idMso, do not assign an id or an idQ.
idQ	qualified id	Qualified control ID, prefixed with a namespace identifier. If you define an idQ, do not assign an idMso or an id.
image	String	Sets the image for a control.
imageMso	control id	Sets the identifier for a built-in image.
insertAfterMso	control id	Specifes the identifier for the built-in control after which the control is positioned.
insertAfterQ	qualified id	Specifies the identifier of a qualified control (that is, the control whose idQ property was specified) after which the control is positioned.
insertBeforeMso	control id	Specifies the identifier for the built-in control before the control is positioned.
insertBeforeQ	qualified id	Specifies the identifier of a qualified control (that is, a control whose idQ property was specified) before which the control is positioned.
itemSize	large, normal	Sets the size for the items in the menu.
keytip	String	Sets the KeyTip for the control. KeyTips display when the user presses the ALT key plus a letter.
label	String	Sets the label for the control.
onAction	callback	Called when the user clicks the control.
onChange	callback	Called when the user commits text in an edit box or combo box.
screentip	String	Sets the control's ScreenTip.
showImage	true, false, 0, 1	Specifed whether the control's image displays.
showItemImage	true, false, 0, 1	In a combo box, drop-down list, or gallery, specifies whether each item's image shows.
showItemLabel	true, false, 0, 1	In a combo box, drop-down list, or gallery, specifies whether to show each item's label.
showLabel	true, false, 0, 1	Specifies whether the control's label shows.
size	large, normal	Sets the size of the control.
sizeString	String	Sets a string, such as "MMMMM". The string sets the width of the control.
supertip	String	Sets the Enhanced ScreenTip for the control. An EnhancedScreenTip is a longer screen tip.
tag	String	Sets user-defined text that enables you to store information about the control that is not pertinent to any other specific property.
title	String	Used with a menu separator. Sets the text displayed (rather than a horizontal line).
visible	true, false, 0, 1	Determines whether the control is visible.

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